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REPORT

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OF THE

GOVERNOR OF ARIZONA

TO THE

SECRETARY OF THE INTERIOR

FOR

THE YEAR ENDED JUNE 30, 1904.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1904

REPORT

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SECRETARY OF THE INTERIOR

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REPORT

OF THE

GOVERNOR OF ARIZONA.

EXECUTIVE DEPARTMENT,
OFFICE OF THE GOVERNOR,
Phoenix, Ariz., August 18, 1904.

SIR: In compliance with the instructions contained in your letter of June 24, I have the honor to submit the following report of the affairs, progress, and development of the Territory of Arizona for the fiscal year ended June 30, 1904:

GENERAL CONDITIONS.

Mining, agriculture, and stock raising are the chief industries in Arizona. During the past year there has been marvelous advancement in the mining operations throughout the Territory. The production of copper is greater than any previous year. Agriculture has not advanced much, owing to the scarcity of water in the streams caused by the light snowfalls during the winter and the almost complete deprivation of rains. The live-stock industry has suffered more, perhaps, than any other, thousands of cattle having died during the latter months of the year.

Conditions change rapidly in the arid regions. While the disastrous effects of droughts are keenly felt in all lines of commercial activity, recovery is swift when conditions change for the better. Those industries that first feel the blow are the first to resuscitate. Prices always advance with adversity in farming, but when the farmer has nothing to sell there is little comfort in this observation.

Dependence is placed in the flow of streams for carrying on successful agricultural and horticultural operations in the valleys of the Territory. Under such conditions there can be no certain progress. Water storage is the only safe plan in the arid sections, and until dams are constructed and the flood waters stored the farmer can never feel assured of a full crop.

The people of Arizona are deeply indebted to the honorable Secretary of the Interior for the Tonto dam, now under construction, and the Yuma project, also assured. They feel that the wisdom shown in these selections will prove a blessing to the Southwest, and eventually yield a rich harvest in national progress. The early completion of these structures, by means of which the flood waters will be saved, will bring prosperity to a deserving people.

Not only agriculture, but mining, stock raising, and all other industries depend upon rain and snow for success. Mining, perhaps, is less dependent than the other industries, but in its incipiency it progresses as conditions are favorable. A great many places where irrigation is practiced the rainfall is sufficient to produce a yield of crops, and artificial irrigation is merely an assistance to bring out a full yield. But in this Territory lands can not be cultivated without artificial irrigation. Therefore, absolute dependence is placed on the flow of streams.

In the Salt River Valley the average precipitation of rain for twenty years was but 6.90 inches. For the year ended June 30, 1904, the precipitation in the Territory was 3.97 inches less than the average of past records, which is taken as the normal.

There was a deficiency in July, the month of greatest normal precipitation, though considerable rain fell during the month; but in August there was an excess, and in September a decided excess, due mainly to heavy rains the latter part of the month. The about normal precipitation of the preceding year, followed by the fair to good rains of July, August, and September, produced a supply of irrigation water which was generally sufficient for the requirements of vegetation. The good rains at the end of September were, however, followed by an extended period of exceedingly dry weather. From October 4 to December 4 no rain whatever fell within the Territory. The droughty condition continued throughout the remainder of the year, though it was occasionally broken by light rains or snows. These were, however, insufficient to materially affect the flow of water in streams, the soil having been dried out so thoroughly as to absorb most of the moisture. In May the precipitation, which occurred mainly in the northeastern and southeastern portions, averaged in excess of the normal, but the normal for May is low, and no material general increase in the flow of streams resulted.

The departures from the normals by months, as reported by Mr. M. E. Blystone, section director at Phoenix, were as follows:

Departure from normal precipitation by months.

Month.	Inches.	Month.	Inches.
1903.		1904.	
July	−0.70	January	−0.82
August	+ .13	February	− .49
September	+ .78	March	− .49
October	− .61	April	− .30
November	− .74	May	+ .33
December	− .90	June	− .16
		Year	−3.97

Crops were generally in good condition at the end of the preceding year, and range feed was abundant. The favorable conditions which prevailed during the latter part of the crop season of 1903 caused good crops to be matured throughout the Territory, and the abundant supply of range feed brought range stock into excellent condition. The heavy rains of the latter part of September placed the soil in excellent condition for fall seeding, but the drought which followed prevented the germination of much of the winter-seeded grain. The continuation of droughty conditions throughout the early part of the

crop season of 1904 and the steady diminution of the supply of irrigation water, which became totally inadequate to meet the requirements of vegetation, damaged crops greatly, and at the end of June these were generally in very unfavorable condition, except in the lower Colorado Valley, where the abundant supply of water furnished by the Colorado River produced excellent crops. The condition of range stock, which had been good until toward the end of the year 1903, deteriorated greatly. Range feed became scarce, and in many sections water could not be obtained. As a consequence all stock suffered greatly and there were large losses by death. This deplorable condition existed at the end of June.

In the statistical appendix on page — will be found tables showing the amount of snowfall at selected places in the Territory during the winter and spring months of the past fiscal year.

The surface of the Territory consists of elevated table-lands, intersected by mountains and interspersed by valleys, many of which are of vast extent. These plains or valleys are as fertile as the far-famed plains and valleys of the Nile, and when brought under cultivation give marvelous returns in grain, fruits, and other products of the soil. It can be truly said of Arizona that in no other country under the sun can there be secured so great a return per acre as can be derived in this Territory by the application of water to and the proper cultivation of the soil.

The Territory possesses one of the finest and most valuable forests in the world, known as the "Mogollon forest," which covers an area of 10,000 square miles, being possibly, with two exceptions, the most extensive body of timber in the world.

Arizona's resources are without limit; its mountains are the storehouses of precious metals, its forests the greatest in the United States, its plains sustain vast herds of cattle and sheep, while valleys produce grains and fruits unexcelled anywhere. It is to-day one of the richest mineral sections in America, and although the mining of the precious metals in this Territory is as yet in its infancy, enough is known to give a slight inkling of the possibilities of this great wealth-producing agency which is eventually to make Arizona one of the richest subdivisions of our country. Every mountain range that has been prospected has shown a wealth of minerals—gold, silver, and copper mining being successfully pursued.

Arizona is blessed with one of the best systems of public schools in the United States. The morals of the people are most excellent, and are cared for by the numerous churches scattered throughout the Territory, which receive intelligent and liberal support from all citizens.

PUBLIC HEALTH.

During the past year the health of the people of Arizona has been excellent. There has been scarcely any sickness of a general character throughout the Territory. There were a number of isolated cases of smallpox reported to the Territorial health board. There was one case of anthrax reported, which happily proved to be due to streptococci germs.

The Territorial board of health has been zealous in its efforts to prevent the spread of disease, and has been successful wherever cases were reported. At a meeting of the board in April the rules of the national

board of health governing the transportation of dead bodies were adopted; also a rule requiring embalmers and undertakers to register with the Territorial superintendent of public health. This rule is a great aid to the vital statistic department, as all embalmers are required to make duplicate reports of all deaths, thus giving a complete record of the Territory in this respect.

POPULATION.

There has been some considerable increase in population in the Territory during the past year, noticeable principally in the mining districts. Just what this increase has been is impossible to ascertain, but I feel safe in saying that it has kept the percentage fully up to the average of late years. The total population of the Territory is in the neighborhood of 165,000 to 170,000.

The census of 1900 gave the Territory 122,212. In 1890 it was but 59,620, making an increase of 104.9 per cent during the decade. This large increase is due in part to the fact that there were 28,469 Indians and 154 other persons, or a total of 28,623 persons, on Indian reservations, etc., in Arizona who were specially enumerated in 1890 under the provisions of the census act, but were not included in the general population of the Territory at that census. The population of the Territory in 1870 was 9,658, and during the ten years from 1870 to 1880 it increased 30,782, or 318.7 per cent, giving a population in 1880 of 40,440. The population for 1890, as stated in the report for that census, was 59,620, representing an increase during the decade of 19,180, or 47.4 per cent.

The superintendent of public instruction, in his annual report for 1904, states that the school population throughout the Territory has greatly increased. In Cochise County alone the attendance is 1,000 greater than the previous year; in Yavapai County a considerable increase is noted; and in Maricopa, Graham, Pima, and Yuma there are evidences of this same character that the population is greater than the preceding year. There can be no doubt of the accuracy of my estimate of the present population of the Territory as given herein. The school population is the best index to the general increase or decrease in population, and with this as a basis the increase throughout the Territory has been considerable during the past year.

The population of Arizona has increased steadily from the time the Indian troubles were settled. There has been no backward step. The conditions were not inviting, for great numbers of settlers could not locate lands and expect profits from agriculture unless water was available. The area of land that could be cultivated was therefore small, and population could not go beyond the area favored. Mining attracted many from the eastern States, and each year new camps have come into existence to augment the population of the Territory. It is probably safe to say that agriculture in the Territory has reached the full extent of the natural water supply, and without the hope afforded by the Government dams now under construction there would be little increase in population in the valleys of the Territory.

What the population of Arizona will be in ten years can easily be imagined. Hundreds of thousands of acres of fertile lands will then be under cultivatiou; certain water supply will assure full yields each year of all products; mining and all other industry will receive assist-

ance from agriculture, and Arizona will be known as one of the richest States in the Union.

To-day we are forced to admit that there is not a valley in the Territory where land is available to the homesteader where he can settle down to the successful pursuit of agriculture with the independence of a Mississippi Valley farmer. Population can not materially increase under such conditions. With a great system of water storage established in Arizona all public land susceptible of irrigation will be at the disposal of the husbandman. There will be land for millions where there is to-day scarcely enough for the present population. Arizona contains more than 10,000,000 acres of land that can be cultivated. Under water-storage conditions in a climate as mild as that of the Arizona valleys the yield of crops per acre will be very large. Seven crops of alfalfa can be harvested where four are now produced. Small ranches will be the rule under such conditions, and the population will be greater per acre than in the Middle and Eastern States. More will be expected of a man by each separate acre, and the capacity of each acre to produce will be from five to seven times greater than under natural conditions.

Agriculture will force other industries ahead; new towns will appear and the older ones will expand; more people will be required in all branches of industry. The mines, assisted in their development by agriculture, will expand in activity, and more laborers will be required.

The live-stock industry, supported by certain pasturage in the valleys, will become a great industry throughout the Territory, adding millions to the taxable wealth. New railways will be built fostering other branches of industry, and all undeveloped resources will receive attention. Arizona will be forced to the highest point of its capacity to produce wealth from all its varied sources.

Extravagant claims are often made, but the possibilities are so great and so far-reaching that no man can dispute them. It can be safely said that Arizona has to-day merely laid the foundation of its future growth.

STATEHOOD.

As loyal and patriotic citizens of a great nation it is but natural that the people of Arizona desire the full prerogative of citizenship. They have built up a commonwealth with that promise, and they believe that they have met all the requirements in social advancement, material achievements, and in the economic management of internal affairs. The population of Arizona to-day is larger than that possessed by almost any of the Territories when admitted to statehood, and in material resources Arizona is probably far in advance of any of the now prosperous States on the day of their admission.

The progress made from year to year is substantial. The production of copper, gold, and silver increases rapidly each year. The old mines become heavier producers and many new ones are constantly augmenting the yield of wealth from this source.

The history of the Territory since its formation in 1863 shows the adverse conditions that retarded progress and the indefatigable energy and perseverance with which they were met and surmounted. The pioneers had first to tame hostile tribes of Indians and bring about new conditions of life before they could hope to accomplish much in material progress.

The physical conditions were such that agriculture could not be made a source of wealth production at once, and irrigation systems had to be inaugurated. Fighting constantly against adversities, the people of Arizona have never yielded an inch, and it must be conceded by all fair-minded men that their achievements are worthy of recognition by the nation in the bestowal upon them of the full privileges of citizenship.

Finding themselves confronted with a plan to unite their Territory with New Mexico, the people of Arizona have protested vigorously, and they will continue to do so until they have defeated this repugnant scheme. The injustice of it should readily appeal to all. Here men have fought for over forty years to strengthen a commonwealth; over $45,000,000 of taxable wealth have been accumulated; $1,000,000 has been invested in churches and church schools; over $1,000,000 has been given to the cause of education in the construction and equipment of public schools; at different points throughout the Territory are located public buildings constructed by the Territory, and everywhere there exists a public spirit and patriotism which shows the character of the people. To be united with New Mexico would bring discouragement to Arizonians. Both districts of the new State would suffer, for the reason that Arizona people would lose heart, and the strife engendered by jealousies would take years to subside. It is natural that Arizonians, proud of what they have accomplished, would feel that they had worked in vain; New Mexico, with its larger population and its greater power, would naturally seek to strengthen its portion, impelled by the hope of division at some later day.

The two Territories as they stand to-day are different in many ways. They have little in common; their laws are dissimilar. It is doubtful if they could ever become reconciled to exist under one form of State government. The same local patriotism existing in Arizona is also to be found to a great extent in New Mexico, notwithstanding the claims of a few citizens of the neighbor Territory who are willing to take this form of statehood rather than none at all. I believe the merger would not be acceptable to the mass of people of either Territory.

I can not add to the protest that has already been made by the people of the Territory of Arizona against this reprehensible measure, and I have only to say that they would desire that their commonwealth remain a Territory indefinitely rather than be joined with New Mexico. They desire to come into the Union as the State of Arizona with the present Territorial boundary, and until, in the wisdom of the nation's legislators, they are permitted to do this, they are content to remain as they are, trusting in the justice of the future years to bring the boon so earnestly sought.

FINANCIAL CONDITION.

Arizona was never in better financial condition. The floating indebtedness, which on June 30, 1903, was $92,341.90, has been completely wiped out, and $20,848.85 remained in the general fund on the close of the fiscal year 1904.

The report of the Territorial treasurer shows that there was received from all sources during the year ended June 30, 1904, the aggregate sum of $829,922.27, including $177,762.54, the balance on hand June

30, 1903. From this there was disbursed $640,628.42, leaving $189,293.85 on hand June 30. Territorial warrants are now paid in cash, a condition which has not existed since the Territory was organized.

This creditable showing is due to retrenchment in public expenditures, aided by the revenue derived from incorporation business transacted in the office of the Territorial auditor. On March 13, 1903, the act of the twenty-second legislative assembly went into effect transferring the incorporation business from the office of the secretary of the Territory to the Territorial auditor, and giving the fees collected to the Territory. Previous to that time these fees went to the secretary of Arizona, and they amounted to thousands of dollars annually. The total amount collected from this source from March 19, 1903, to June 30, 1904, was $41,111.25.

The bonded indebtedness of the Territory at the close of the fiscal year, as shown by the statement of the Territorial treasurer, which appears in the statistical appendix of this report, was $1,010,972.43. During the year $10,154 of insane asylum bonds, with accrued interest, were paid.

The tax levy, as fixed by the board of equalization of the Territory, is the lowest since 1900. For each $100 of valuations the Territorial tax is 95 cents. In 1903 it was $1.05; in 1902 it was 1.13\frac{7}{10}$; and in 1901, $1.17. When consideration is given to the extensive improvements made in Territorial institutions since 1900, when the tax levy was but 85 cents, it will be seen that the tax of 1904 is proportionately lower than at any time in the history of the Territory. New buildings have been erected to accommodate the growing needs of the University of Arizona at Tucson; additions have been made to the Tempe Normal School; improvements and extensions have been made at the Territorial penitentiary; the Territorial industrial school has been erected and placed in operation; substantial improvements have been made at the Northern Arizona Normal School at Flagstaff; and large expenditures represented in Territorial bonds have added to the responsibility and substantiability of the Territory. While the valuation of taxable property in the Territory is $12,560,025.03 more than it was in 1899, the tax rate, with all the added improvements in Territorial institutions, is but 10 cents more in 1904.

Many of the railways in the Territory are exempt from taxation, $1,000,000 of church property is not taxed, and the system of taxing mines gives the Territory but little revenue. A very small tax placed on the net production of all mines would yield sufficient revenue to materially lessen the Territorial tax on all other property.

The condition of banks as reported in the statement of the bank comptroller, given in the statistical appendix of this report, shows a gain over the preceding year and presents a healthful condition of these financial institutions.

On the whole the Territory is in most excellent condition at the close of the fiscal year.

TAXATION AND TAXABLE PROPERTY.

There has been a gain in the taxable property in the Territory during the year amounting to $1,981,504.70. The total taxable property of the several counties is $45,069,545.32.

The tax levy of 95 cents on the hundred dollars of valuation is the

lowest since 1890, and, proportionally, lower than any year of the Territory's history. The expense of new Territorial institutions, such as the industrial school, additions to the university and normals, the prison, and asylum for the insane, keeps the tax rate high in Arizona, yet each year since 1900 there has been a reduction in this rate, and there is every reason to believe that it will continue to decrease from year to year.

Many reforms in the method of taxation are needed before the full valuation of all taxable property can be ascertained. It is apparent that the valuations of live stock as returned by many of the counties to the board of equalization are inaccurate. The full number of live stock in the Territory, if taxed in the different counties, would materially increase the income derived from taxable property.

The mining industry escapes its just share of taxation. The income that could be derived from this source would greatly lessen the tax levy for all other property, and would in no sense retard the progress of that great industry. A very small tax on the gross bullion production of all mines would give the Territory an immense income, and there could be no objection on the part of mine owners in rendering this assistance to the Territory in which their mines are located and whose protection is ever freely given. This matter was brought to the attention of the last legislature in the message of the governor.

The report of the board of equalization which appears in the statistical appendix to this report shows the following counties to have gained in taxable wealth during the year, the amount appearing after the name of the county: Apache, $40,740.22; Cochise, $1,096,993.99; Graham, $1,052,177.71; Maricopa, $98,214.03; Mohave, $45,120.44; Pima, $211,116.17; Yavapai, $172,065.80; Yuma, $5,132.10.

The counties showing losses are: Coconino, $437,475.64; Gila, $60,097; Navajo, $125,136.81; Pinal, $33,337.59; Santa Cruz, $84,008.72.

The losses of live stock during the year by reason of the prolonged drought occasioned much loss of revenue to the stock-raising counties, some of them this year showing but one-half the number of cattle that was reported last year. The action of the Government in setting aside forest reserves has also lessened the revenues in some of the northern counties.

EDUCATION.

The advancement made in school work throughout the Territory is a pleasing index to the general character of school officers, the high standard of excellence which they demand of instructors, and the interest manifested by the people of the Territory. Teachers who have had special training in school work have been demanded, the records of the office of the superintendent of public instruction showing at least 65 per cent of the teachers employed to be graduates of normal schools, universities, and colleges of high rank. Graduates of the two Territorial normal schools are engaged long before they receive their diplomas of graduation. The demand in Arizona during the year shows that the people realize the necessity of securing the best instructors, and trained teachers find no trouble in securing employment. The graduates of the Arizona normal schools are admitted to the schools of California and other Western States without examination.

The examining board of the Territory is careful in giving diplomas to teachers coming from other States and Territories, demanding that

they shall have been trained for the work. Examinations are very strict and exacting, every safeguard being taken to insure the entrance in the schools as teachers of only those possessing the highest qualifications.

There are two normal schools, one at Tempe and the other at Flagstaff; three high schools, organized under a special high school law, one being at Phoenix, one at Prescott, and one at Mesa. The graduates of these high schools are admitted to colleges of high standing on their diplomas of graduation.

During the past year the total receipts for school purposes was $440,000. Of this sum $330,000 was solely for the maintenance of the public schools, the sum of $110,000 being used for the redemption of bonds, payment of interest, and miscellaneous purposes. The total receipts were about $23,000 more than the previous year.

Owing to extensive building operations, the disbursements have been more than the receipts, the total amount expended being $525,000. Of this sum $390,000 was for school maintenance, and $135,000 for the payment of bonded indebtedness, building, and miscellaneous purposes. The excess in expenditures was about $28,000 over the previous year. Seventeen new school buildings have been constructed during the year, and extensive improvements made in all school property. The number of new school districts organized was 19.

The school population has not increased as rapidly as in previous years. Cochise County made the greatest gain in this respect, showing an increase of over 1,000 children of school age enrolled in the schools of that county. Other counties have gained in school population, although the total increase is but 3.75 per cent. The enrollment has increased 6 per cent, and the average daily attendance 8.5 per cent.

Owing to the increased enrollment of pupils, 37 additional teachers have been employed in the Territory. The number of children between 6 and 21 years of age, as reported by the superintendent of public instruction, was, on June 30, 1904, 27,051; the enrollment for the year was 21,220; and the average daily attendance was 13,000.

The school districts of the various counties received some assistance by the apportionment of $33,066.74, received from taxes exacted by the Territory from foreign insurance companies doing business in the Territory, and other sources.

UNIVERSITY OF ARIZONA.

Substantial progress has been made by the Territory's leading educational institution during the year. The gymnasium has been equipped with apparatus and furnishings necessary for rendering the greatest benefit to the students, including shower baths and lockers, the expenditures along this line slightly exceeding $2,000. The new library and museum building was ready for the roof at the close of the fiscal year. This structure will cost $26,000 when completed. Two new greenhouses have been erected for experiment work at a cost of about $500; the mill building of the school of mines was removed to a new site and rebuilt at a cost of $1,628; new drives have been laid out and roads constructed, trees planted, and other decided improvements made in the grounds.

The attendance increased during the year to 205, and the faculty was increased by additional instructors in metallurgy and athletics.

The purpose of the University of Arizona is, in the language of the organic law, "to provide the inhabitants of this Territory with the means of acquiring a thorough knowledge of the various branches of literature, science, and the arts;" and so far as possible a technical education adapted to the development of the peculiar resources of Arizona. In furtherance of this latter purpose, instruction is especially provided in agriculture, the mechanic arts, and in mining and metallurgy. The agricultural experiment station, a department of the university, is wholly engaged in investigating and developing the agricultural resources of the Territory. The institution aims to fill in the Territory the place occupied in the States by the State universities. The undeveloped condition of secondary education in the Territory and the desire to make the university serviceable to all have led to the establishment and maintainance of a subcollegiate department.

The University of Arizona is located at Tucson, one of the largest towns in the Territory, on the main line of the Southern Pacific Railway, 312 miles west of El Paso, Tex., and 500 miles east of Los Angeles, Cal. The town lies in a broad, flat valley at an elevation of 2,400 feet above sea level, and is surrounded by mountains. Its dry, healthful situation, with its mild and equable climate, has made Tucson a famous winter resort.

The winter climate is especially good; the temperature is cool and strengthening but not severe, the lowest temperature recorded during the average year being about 20° F. Little rain falls during the winter; fogs are unknown; cloudy days are rare. The percentage of sunshine throughout the winter is greater than that recorded at any other place in the United States. Owing to the extreme dryness of the air the highest temperatures known are less oppressive to the senses and less dangerous to the health than the summer heat of the upper Mississippi Valley States. The total amount of rainfall averages less than 12 inches.

The university is situated upon high ground, about a mile from the business center of the city, with which it is connected by a street-car line. On every side it commands a view of mountain scenery of remarkable extent and grandeur. The location can not be surpassed for healthfulness. The water supply of the university is drawn from a well on the campus 120 feet deep, and is of unusually good quality.

The main building, University Hall, is 200 by 105 feet, two stories in height, the first story of gray stone, the second of red brick, and is completely surrounded by a wide two-story veranda. The building contains the administrative offices, recitation rooms, laboratories, and apparatus rooms of various departments, the libraries of the university and experiment station, and the Territorial museum.

North Hall, a dormitory two stories in height, built of gray stone of fine quality, originally provided as a home for male students, is now occupied by the young women. Besides the parlor and the rooms of the matron, it contains 16 rooms, each large enough to accommodate two students. The building was renovated in 1903, a large and handsome parlor being fitted up and furnished by the university.

South Hall, a brick dormitory containing 40 rooms, with bath and toilet rooms, is for the use of male students and instructors. The discipline of this dormitory is in charge of the commandant of cadets.

A new dining hall 40 by 104 feet in size, with kitchen, provides ample accommodations for all persons living in the dormitories.

A library and museum building to cost $26,000, exclusive of furnishing, provided by the twenty-first legislative assembly, has been in course of erection during the current year. The contract calls for completion of the building in September, 1904. Five thousand dollars was appropriated by the last legislative assembly for furnishings.

The gymnasium, given the university by Prof. James Douglas and his associates of the Copper Queen Consolidated Mining Company, is now completed. With the $2,000 appropriated by the legislative assembly for equipment, a large quantity of first-class gymnasium apparatus has been purchased and installed. Shower baths with necessary plumbing, and about 100 lockers have put the gymnasium in excellent shape for steady use.

The shop and assay building is a large substantial brick structure. It contains a commodious drawing room for mechanical and freehand drawing, a large forge, machine and carpentry laboratory, in which are placed 24 forges, 4 lathes, drills, besides engine and locker rooms. The commercial assaying department occupies a suite of rooms fully equipped with a large melting furnace, the necessary muffle furnaces, and other accessories for making complete and accurate assays.

The mill building is located on the tract of land at the northeast of the campus, acquired by the university with the $1,400 appropriated for that purpose by the last legislative assembly. The building with machinery, formerly constituting the annex to University Hall, was removed in the fall of 1903 to the new site.

Three brick houses, two stories in height, are occupied as homes by the president and professors.

Other buildings are the boiler house, which also contains the well and pumps whereby the water supply for irrigation and general purposes is obtained; a greenhouse, 80 by 21 feet; two propagating houses; the cottage operated by the classes in domestic science, and a temporary wooden building used for various purposes.

The library, containing 8,100 bound volumes, and 11,000 pamphlets, is open to the use of all students. A valuable feature of the library is the collection of complete sets of scientific and literary periodicals, which are of special service in research work.

The reading room is furnished with about 70 scientific, literary, and general periodicals, besides the weekly Territorial newspapers.

The Carnegie Library of the city of Tucson is also open to the use of the students of the university.

The seventeenth legislative assembly of Arizona passed an act establishing a general museum at the university. The object of the museum is to collect materials of all kinds illustrating the resources and development of Arizona, and particularly to preserve historical relics, including those pertaining to the aboriginal inhabitants.

Donations of specimens and collections will be received and gratefully acknowledged, but no special provision has yet been made by the Territory for the support of this department, aside from a small appropriation for the salary of a curator.

The collections now displayed at the university comprise representative series of minerals, ores, and rocks of Arizona. Among these may be particularly mentioned superb specimens from the mines of the Copper Queen at Bisbee. There are also collections of typical

rocks and minerals for comparison, and many specimens of ores from different parts of the United States and from abroad. Great numbers of valuable specimens are now stored in trays preparatory to classification and distribution in cases. It is desired to make the collection of ores and minerals fully represent the great mineral resources of Arizona.

The museum is indebted to Mr. Herbert Brown, curator, for a large and valuable collection of skins of the birds of Arizona, which he has deposited in the museum, as well as for a collection of ancient aboriginal pottery and other relics. The fossil skull and teeth of an elephant and other fragmentary remains of extinct animals sent from Yuma by Mr. Brown also deserve special mention.

Historical records of much value are gradually accumulating as a part of this museum, and an appeal is made to old settlers and others to bear this fact in mind when making disposition of articles bearing even remote relation to the early pioneers and their history.

The professors at the university have the immediate care of the collections pertaining to their respective departments.

The biological laboratories are located in that portion of University Hall formerly occupied by the museum. The laboratories are convenient and well lighted and the equipment is such as is required for modern instruction and research in the biological sciences. The library and apparatus are well selected and adapted to the region and the courses offered.

The collections possessed by this department form a very important part of its equipment. The herbarium consists of 12,000 sheets of mounted plants, of which number 2,500 are included in the university botanical survey herbarium. The unique flora and fauna of the mountain, mesa, and lowland collecting grounds in close proximity to the institution offer very attractive opportunities for instruction and research, especially along ecological lines. The desert botanical laboratory of the Carnegie Institution supplements in most admirable fashion the facilities of the university for investigation.

In addition to the above there are 50 cases of insects, a large case of seeds, articulate and disarticulate human skeletons, plaster and papier-maché models of the important structures of the human anatomy, and duplicate material for study and dissection.

The chemical laboratories are two in number. That used for beginners in the study of general chemistry and qualitative analysis is on the second floor of University Hall and is equipped for the experimental and theoretical study of chemical science.

The laboratory for qualitative analysis is on the first floor of University Hall. It is provided with analytical and bullion balances of the latest model and is equipped for the teaching of volumetric and gasometric analysis, blowpipe analysis, metallurgical chemistry, and wet and fire assaying, including apparatus for the electrolytic determination of metals. A portion of the room formerly used as an assembly hall has been fitted up as a balance room.

The chemical apparatus and collections are adequate and the equipment is good, but the increase in the number of students has overcrowded the laboratories.

The laboratory of the experiment station occupies three rooms on the first floor, being devoted to analytical work and chemical investigations relating to agriculture. Though not intended for the use of

students, it is of incidental value to the institution through the investigations which are here conducted.

The laboratory for quantitative analysis is used for determinative mineralogy and blowpipe analysis. The laboratory is supplied with necessary apparatus for student work, including glass and wood models for the study of crystallography, hand and reflecting goniometers for the measurement of the angles of crystals, and a polariscope for the study of the optical properties of minerals, and a type set of 600 minerals.

Three rooms on the first floor are set apart for the teaching of physics. The facilities for experimental demonstration of all important phenomena are very complete. The lecture room is fitted with shutters so that it can be darkened. A beam of sunlight directed by a fine clock heliostat outside may be thrown steadily across the lecture table for experiments in light, or used in connection with the solar lantern for a variety of other work. Adjacent to the lecture room are the laboratory and the apparatus room. Both lecture room and laboratory are supplied with water and gas.

An 8-inch Willyoung induction coil, with storage and X-ray accessories, is used in the study of light-tension electricity.

This department has also a double dissolving arc-light Ideal stereopticon, which is used by various other departments of the university.

In a partly developed territory like Arizona the engineer is called upon for the solution of a great variety of problems in the various lines of civil, hydraulic, mechanical, and mining engineering, and in many difficult situations he must depend upon his knowledge and inventive ingenuity to supplement a meager equipment. To prepare the engineering student for such experiences the apparatus in this department has been chosen with a view to giving him the greatest familiarity with the theory, construction, and use of those instruments and machines which observation has shown to be of universal adoption in practical engineering work. This apparatus embraces surveyors' and engineers' chains; standard field and pocket tapes; plain and solar compasses and transits; mining transits; engineers' levels; stadia, level, and transit rods; aneroid barometers; odometer; automatic water registers; hook gauges; three forms of current meter; stop watch; meteorological instruments; drafting instruments; mechanical calculators; blueprint apparatus; a 4¼-inch astronomical telescope with equatorial mountings and accessories; celestial sphere; pumps, steam gauges; indicators; planimeter and calorimeter.

Because of the situation of the Territorial university the educational work in agriculture and horticulture has taken peculiar form, being largely conducted on the correspondence plan, particularly through the "Timely hints for farmers," issued under the auspices of the experiment station, but of distinct educational value. Three thousand farmers of the Territory are reached regularly twice a month by timely publications on subjects of vital interest.

Small and well selected agricultural libraries of slight cost have been forwarded to a considerable number who have expressed a willingness to receive them.

It is believed that this method of dealing with our situation will become increasingly useful.

The equipment for agricultural instruction is good, consisting of an excellent seed collection, a greenhouse, and gardens for experimental

purposes containing many rare and interesting plants, and a well-selected agricultural library.

The assay laboratory is equipped with assay furnaces for crucible work, for scorifying and cupeling, and for retorting mercury from amalgam, besides all needed appliances for assaying by dry and wet methods, including electrolysis. The laboratory also has desks and fittings for the chemical work required in the metallurgical and mineralogical investigation and analysis of ores and mineral fertilizers, and in qualitative tests of minerals.

The mechanic arts building, provided largely through the generosity of the Copper Queen Consolidated Mining Company, has a total floor area of 7,900 square feet, divided as follows: Power room and drafting room, each 1,200 square feet; wood-working shop, forge shop, and machine shop, each 1,400 square feet; wash room, 600; model room, 400, and storeroom, 300 square feet.

Each shop provides working space for 24 students at benches or forges, and ample space for machines and tool rooms. The drafting room accommodates 36 students.

The power room contains an engine, a new 15-horsepower motor, a blower, and exhauster.

The wood-working shop is equipped with a full assortment of hand tools, 4 wood-turning lathes, a universal wood worker, a dimension sawing machine, and other modern wood-working appliances.

The forge room contains 24 down-draft forges, 24 anvils, a blacksmith drill press, and all necessary small tools.

The machine shop contains three 14-inch engine lathes, one 24-inch engine lathe, one 16-inch shaper, one 24-inch planer, one 24-inch drill, one universal milling machine, one grinding machine, several small machines, vises, and a complete outfit of small tools.

The entire building is well lighted and ventilated, and the drafting room is heated by steam.

Room O in University Hall is used as an armory. It is fitted with the necessary gun racks and accessories. The equipment includes 150 old-style Springfield rifles, 100 Springfield cadet rifles with complete accouterments, 8 swords and belts, one 3-inch muzzle-loading rifle with carriage and complete equipment, together with necessary musical instruments and signal flags.

Herring Hall, the new gymnasium, has been fully equipped for the use of the students for the purposes of physical culture and athletics. The equipment procured from the Narragansett Machine Company of Providence, R. I., at an expense of about $1,500, includes 96 lockers, chest weights, dumb bells, bar bells, Indian clubs, a Medart vaulting horse, parallel bars, a horizontal bar, a quarter-circle, an abdominal chair, striking bag and drum, wrestling machine, wrist machine, finger machine, chest developer, chest expander, climbing rope, flying rings, traveling rings, jump and vaulting stands, fencing foils and masks, basket ball and goals, five large mats, and a set of anthropometric apparatus. In the bathroom a heater and large reservoir provide hot water for the five shower baths.

AGRICULTURAL EXPERIMENT STATION.

The agricultural experiment station is a legally constituted department of the university, whose purpose is "to aid in acquiring and diffusing * * * useful and practical information on subjects con-

nected with agriculture, and to promote scientific investigation and experiment respecting the principles and application of agricultural science."

With the above objects in view, the organization of the station includes the departments of administration, agriculture and horticulture, animal husbandry, botany and chemistry, the whole or a major portion of the time of one or more members of the station staff being devoted to each department of the station work. Provision is made for meteorological and entomological work also, though to a less degree.

Owing to the wide variation in agricultural conditions in Arizona, it has been found of advantage to distribute the work so that each department is located, so far as possible, in the situation most favorable to the accomplishment of its own special results. According to this principle the various lines of experiment station work have been distributed as follows:

The director's office and the departments of botany and chemistry are maintained at Tucson in the university buildings. Through this arrangement the experiment station profits by the buildings and libraries of the university, while the university is benefited from time to time by the teaching ability of members of the station staff. It has been found that from this base of operations the three great agricultural districts of the Territory—Salt River Valley, the lower Colorado, and the upper Gila—are accessible with equal convenience for field work and observations.

On the same grounds—fitness of location for the work undertaken—the experiment station farm has been maintained and strengthened at Phoenix. Salt River Valley is intermediate in elevation, in situation, and in mean yearly temperature between the other two important farming districts above mentioned, and for this reason the agricultural and horticultural results obtained there are capable of the most general application in the Territory at large.

On the same principle again, the date palm orchard is located in the alkaline district south of Tempe, where a successful demonstration of this palm as a commercial fruit producer will be of the greatest value, creating use for great areas of alkaline land in the arid Southwest.

The range station also, for the study of worn-out range country with a view to its reclamation to usefulness, is located in a typical district near Tucson, and is conducted under the auspices of the department of botany, cooperating with the United States Department of Agriculture.

The services of specialists in various subjects, such as entomology, meteorology, and soil survey work, have also been secured from time to time.

The results of the experiment station work are made public at frequent intervals in the bulletins and reports of the station. These publications are made in two series, first, the longer and more technical bulletins, stating in considerable detail the investigations as they mature, and secondly, the Timely Hints for Farmers, which are brief writings issued at the time when they will be most useful, written in plain language, and presented in popular form. The annual reports also are for the most part written popularly, and afford a convenient and reliable summary of each year's work as it comes to completion.

The experiment station work, conducted and published on the lines indicated above, has a twofold value. In the first place, the sugges-

tions made or derived from the investigations of the station are of direct material profit to the agricultural public and are intended to be immediately applied to advantage in the betterment of agricultural practice. In the second place, these writings are intended to serve an educational purpose, inasmuch as they are so presented as to constitute lesson sheets for the benefit of the careful reader. It may therefore be considered that the experiment station reaches a class of some 3,500 readers in the Southwest at frequent intervals by means of its "Timely Hints" and other publications. The operations of the range, study tract at Tucson, the experiment station farm at Phoenix, the date palm orchard at Tempe, and the sugar-beet plots on the upper Gila serve also as an object lesson to the adjacent public.

It is believed that this distributed and mobile organization is especially effective, not only for the purpose of the experiment station, but also for those of the university as well, since it allows the station to conduct its work in localities suitable for the accomplishment of results; and again, it causes the public to become better acquainted with the Territorial university, of which the station is a department.

An appropriation of $11,000, made for the use of the station by the twenty-second legislature, very satisfactorily attests the estimation in which the work of the station is held. This appropriation is intended for the improvement of the date orchard, for purchasing live stock and buildings for the farm, and for issuing publications and holding farmers' institutes and short courses of instruction throughout the Territory.

Provision, therefore, is made for the symmetrical development of this work in the Territory, both experimentally and educationally; and, prospectively, "the farmers' college" bids fair to increase in usefulness to the growing agricultural interests of the Territory.

NORMAL SCHOOL OF ARIZONA AT TEMPE.

The Normal School of Arizona is located at Tempe, a city of 1,200 inhabitants, 9 miles from Phoenix, the capital of the Terrritory. It has railroad connections with the Southern Pacific and Santa Fe systems.

The school is located in the midst of an intelligent and moral community, engaged in farming and fruit raising. The buildings are of the latest design, provided with all the modern conveniences, well adapted to school purposes, and pleasantly situated.

The legislative enactment which established this normal school provides that instruction shall be given in the "art of teaching" and also "in all the various branches that pertain to a good, common school education;" also, "in the fundamental laws of the United States and in what regards the rights and duties of citizens." The present course of study shows that the legislative intent has been carefully observed.

The new normal school building was erected in 1894. It is a commodious structure, 136 feet long, 80 feet wide, and 3 stories high; the lower story is of brown sandstone, the other two of red, pressed brick with sandstone trimmings. This edifice is beautiful in architectural design, convenient in arrangement, and substantial in construction.

The building first used for school purposes was erected in 1886, is a one-story brick structure, 70 feet long and 60 feet wide, with a broad veranda entirely surrounding it, and a 10-foot hall extending through

it from north to south. The building has been remodeled and completely furnished and is now being used for a training school. It contains an assembly room, teachers' office, and five class rooms.

There are two dormitories situated on the campus, one for young women and one for young men.

The girls' dormitory is situated near the southwest corner of the campus, facing the street on the west, and conveniently near the school buildings. It is constructed of brick, two stories in height, and furnishes rooms for 70 young ladies. Each room is intended for the accommodation of two students, and is provided with two wardrobe closets and with city hydrant water, electric light, and furnace heat. The furnishings of each room include carpet, study table, chairs, dresser, two single beds with all necessary linen, bedding, and blankets. There are ample well-lighted hallways, two large parlors, and a comfortable sitting room. On both floors are located toilet rooms and baths with hot and cold water.

The boys' dormitory is situated on the campus east of the training school, and is a two-story brick building of pleasing design. The furnishings are similar to those of the girls' dormitory.

The normal grounds, which cover an area of 20 acres, have been beautifully laid out by an experienced landscape gardener. A fine system of graveled drives and walks bordered with grassy lawns and lined with shade trees, shrubbery, and flowering plants gives the grounds the appearance of a well-kept park. The campus includes a parade ground for military drill, a basket-ball ground, and tennis courts, and an athletic field including football ground and running track.

The school is organized in three divisions—the normal, the subnormal, and the training. The subnormal course consists of one year, and only those are admitted to it who have done an amount of work equivalent to that taken in the first eight grades of the public schools. The normal department consists of a four years' course, one-fourth of which is devoted to strictly professional instruction. The training department is an adjunct to the normal proper and is designed to give the members of the senior class actual practice in teaching.

The endeavor of the faculty is to enforce strict discipline in all departments of the school, the aim being to secure this by an appeal to the honor of the student; but, in case of failure to secure the desired end in this way, the faculty will not hesitate to enforce prompt obedience to all rules and regulations. Those who do not conform cheerfully to all requirements are permitted to withdraw or are dismissed from the school.

The school offers to students the advantages of a conveniently arranged and well-lighted library and reading room on the first floor of the main building. The library already contains about 3,000 carefully selected volumes, covering the fields of history, science, education, general literature, and standard modern fiction. One thousand additional volumes have been ordered and will be placed upon the shelves before the opening of the next school year. There is a generous supply of encyclopedias and other general reference works. The reading room is fitted with serviceable tables, well supplied with the leading periodicals—literary, educational, and scientific—and a card catalogue greatly enhances the value of the library.

The supply of illustrative material in the museum includes a collec-

tion of fossil forms, a collection of minerals, and a beginning of a series of the native woods of Arizona. A working collection of marine forms has recently been obtained from the biological station at Woods Hole, Mass. There is a rapidly growing herbarium of native plants for comparison and illustration. Additions to the collections have been received during the past year from the following: William R. Price, J. M. Culver, Alma M. Davis, Phoenix; John M. Lindsey, Santa Barbara, Cal.; Dane Coolidge, San Francisco, Cal.; Dr. Charles H. Jones, Dr. W. G. De Vore, Miss Della Penn, Robert Finch, James Goodwin, Walter Johnston, Tempe, Ariz.

The physical and chemical laboratory is equipped with suitable tables, with water-supply and waste pipes, and lockers for individual apparatus. The outfit of chemicals, glassware, and apparatus is ample for a large class, each student being provided with the necessary apparatus for the series of experiments. The stock of physical apparatus, besides that necessary for lecture experiments and class demonstration, includes a sufficient number of duplicate sets to enable an entire division to work simultaneously at the same exercise, by this means effecting a great saving of time in the laboratory practice.

The biological laboratory is furnished with tables to accommodate a large class, and is supplied with dissecting microscopes, glassware, dissecting instruments, etc. The stock of compound microscopes is yearly being increased, and there is an equipment of apparatus for the preparation of histological material.

NORTHERN ARIZONA NORMAL SCHOOL.

The fifth year of the Northern Arizona Normal School opened September 8, 1903, with an increased attendance over any previous year, and the increase was entirely from outside of Coconino County. The counties of Apache, Navajo, Gila, Yavapai, Mohave, and Coconino, in Arizona, were represented, and three students from the State of Kansas were among those registered.

The board of education were compelled, at the beginning of the school year, to rent the second dormitory, and both have been filled to their utmost capacity during the entire year.

The dormitory is no longer an experiment, but a necessity so far as the success of the normal is concerned, and at the present time it seems almost certain that the third building must be rented to accommodate the prospective students who may wish to enter in September, 1904.

This condition of things simply leads to the suggestion that a substantial appropriation should be made by the legislature for a suitable dormitory near the normal building, which would greatly facilitate the handling of the students and also save the large sum paid out for rent and other incidental expenses, caused by the inappropriateness of the houses rented for dormitory purposes. The amount paid for rent alone during the past school year is over $500.

The past year has witnessed very substantial improvements in this normal; among them the efficient hot-water heating plant, the many substantial improvements made in the chemical and physical laboratories, the six compound microscopes, the large number of volumes added to both the reference and circulating libraries, and many other improvements of a minor character, which every growing institution needs to keep pace with the advancement of an educational age.

It is also an industrial age, and this suggests that an industrial department should be added to the normal schools, if they accomplish their full mission for the public schools and homes of the Territory. To be convinced fully of this truth the incredulous need only to visit one of the industrial schools now so common in every part of the United States. All the faculties must be trained if symmetrical development results. The child of the twentieth century has a right to demand such development.

The second summer session at the Northern Arizona Normal School opened June 27 with an enrollment of 30 students. In this enrollment the counties of Apache, Navajo, Coconino, Yavapai, Mohave, Gila, Maricopa, Pinal, and Pima were represented. The States of New York, Kansas, and the Territory of New Mexico were also represented.

The enrollment for the school year ended June 30, 1904, was 16 boys and 57 girls in the normal department and about 34 in the training department.

The number of graduates on the evening of June 17 was eight, and all members of the class are now engaged to teach in the public schools of Arizona.

The Northern Arizona Normal School has graduated 28 students, and more than 80 per cent of this number are engaged as teachers in the public schools of the Territory.

The classes in Spanish and Latin have been very popular, and the enrollment in each subject has been large. The teachers from all parts of the Territory speak most enthusiastically of the wisdom on the part of the board of education in introducing Spanish, because of the help they receive in their work in being able to speak Spanish.

It is not the intention, however, to teach Spanish in the public schools, but to put the graduates in a position to do effective work for the Territory in their profession.

Regarding the teaching of Spanish in the normal, and the mission of the normal as an educational institution, President A. N. Taylor says:

I am very sure that the wisdom of the board of education commends itself to every friend of the public school system in Arizona.

The mission of the normal school is to give scholastic and professional training to those who intend to enter upon the profession. The object and methods of work of the normal school differ from the academy and college. The normal school is a professional school designed to equip intending teachers thoroughly for their work, and to afford those who are now teaching opportunities for better preparation. The essential qualifications of a teacher are cultured powers and a well-informed mind. A teacher must possess knowledge to be able to instruct others. To teach effectively what he does not know is impossible. He should know much more than he attempts to teach. He needs the culture for the power that it gives, the power to think, to originate, to influence, and control.

Thorough scholarship lies at the foundation of a teacher's course of study. A normal school should make ample provisions for the scholastic and professional training of its students.

If this be the purpose of the Territory in establishing normal schools, certainly the wisdom of the board of education of the Northern Arizona Normal School must be strongly commended for the conservative yet substantial advancement made to the end that superior scholarship and professional training may be the possession of anyone who may take advantage of the splendid equipment of the Northern Arizona Normal School.

The regular session of forty weeks will open September 13, 1904, and the promise for a large increase in attendance is such that undoubtedly the third dormitory will have to be rented.

CHURCHES.

Arizona has many beautiful church edifices. In Phoenix, Tucson, and Prescott the churches are very large and commodious, and in many of the smaller places are to be found edifices creditable to the Christian zeal and public spirit of the citizens. The Methodist Church South in Phoenix is one of the recent structures of importance, and is perhaps one of the largest houses of worship in the Territory. The Baptist Church was completed during the year in Phoenix, capaciously built and elegantly appointed. It is a reflection of the progress made by that society in Phoenix under the guidance of Dr. Lewis Halsey. It would be impossible to mention all of the improvements made throughout the Territory, but I am glad to report that they have been extensive and substantial.

The different denominations represented in the Territory at the present time are the Roman Catholic, Church of Jesus Christ of Latter-Day Saints, Presbyterian, Methodist Episcopal, Christian (Disciple), Baptist, Congregational, Protestant Episcopal, Free Methodist, Seventh-Day Adventist, Dunkards, Salvation Army, Christian Science, River Brethren, Lutheran, Christian Reformed, Faith Mission, Gospel Union, Mennonite.

The Roman Catholic Church leads in membership, having about 30,000 members. There are 26 priests in the Territory, 40 Sunday schools are conducted, 8 parochial schools with a total attendance of about 1,500, and 29 churches.

The Church of Jesus Christ of Latter-Day Saints is very strong in Arizona. There are four stakes, the total membership being something over 7,000, this not including children under 8 years of age. The members are commonly known as "Mormons" and represent a sturdy, energetic class of citizens. Children are not baptized until they reach the age of 8 years, and until baptized they are not included as members of the church.

The Presbyterian Church comes next in point of membership, having 2,375 members. The churches are in a flourishing condition throughout the Territory, and excellent work is being done to promote Christianity and good citizenship. The Protestant Episcopal Church has a membership of 1,781, with 10 churches. The Methodist Episcopal Church has a membership of 1,161, with 21 churches. The Baptist has a membership of 686, showing a considerable increase during the year.

There are 163 churches in Arizona, and the total membership of all churches on June 30, 1904, was 44,924, many churches not having reported are not included in these figures. The total church membership in Arizona is probably over 51,000. The aggregate value of church property is about $1,000,000. Church property throughout the Territory is not taxed.

The advancement has been very encouraging. Almost every community is now supplied with religious ordinances. The ministry is held in the highest esteem, and I am glad to report that their untiring work is bringing the results so much desired by them and all good citizens of the Territory.

CHURCH STATISTICS.

Roman Catholic.—Ministers, 26; membership, about 30,000; Sunday schools, 40; schools, 8; attendance, 1,500; churches, 29. Where located: Tucson, San Xavier del Bac, Bisbee, Douglas, Naco, Benson, Wilcox, Clifton, Metcalf, Morenci, Flagstaff, Williams, Winslow, Florence, Nogales, Tombstone, Phoenix, Tempe, Wickenburg, Prescott, Congress, Jerome, St. John's, Concho, Springerville, Solomonville, Globe, Yuma, St. Michael's. Value of churches, about $145,000; value of parsonages, about $30,000; value of hospitals, orphan home, and other property, about $110,000; value of school property, about $50,000; total value of property, about $335,000.

Church of Jesus Christ of Latter-Day Saints.—There are four stakes of this church in Arizona—St. Joseph, St. John's, Snowflake, and Maricopa. Ministers, 231; members, 7,004; Sunday schools, 41; attendance, 2,665; schools, 8; scholars, 803; churches in the Territory, 39. Where located: Bryce, Central, Clifton, Eden, Franklin, Graham, Hubbard, Layton, Lebanon, Mathews, Pima, St. David, Thatcher, Bisbee, San Pedro, Enterprise, Provo, Emery, St. Joseph, Woodruff, Snowflake, Taylor, Shumway, Pinedale, Showlow, Mesa, Alma, Lehi, Pine, Papago, Wards, and 8 located in St. John's stake the names of which are not reported. There are also 5 auxiliary organizations similar to Sunday schools in their scope of work, Women's Relief Society, Young Men and Women's Mutual Improvement Society, primary and religious classes. The church has property in the Territory valued at $132,882.

Presbyterian Church.—Ministers, 19; members, 2,375; increase during year, 263; Sunday schools, 28; attendance, 2,587; schools, 1; scholars, 150; churches, 22; where located—Florence, Casa Grande, Gila River Reservation 5, Salt River Reservation 2, Phoenix, Bisbee, Peoria, Morenci, Flagstaff, Clifton, Solomonville, Safford, Springerville, Metcalf, Chloride, Tucson, Douglas; value of churches, $97,300; value of parsonages, $8,700; parochial schools, 1; value of school property, $21,000; total value of property, $126,000.

Protestant Episcopal.—Ministers, 8; members, 1,781; Sunday schools, 9; attendance, 437; churches, 10; where located—Fort Defiance, Winslow, Prescott, Phoenix, Tuscon, Globe, Tombstone, Nogales, Douglas, Bisbee.

Methodist Episcopal.—Ministers, 20; members, 1,161; Sunday schools, 22; attendance, 1,966; churches, 21; where located—Bisbee, Douglas, Flagstaff, Glendale, Globe, Jerome, Kingman, Mesa, Needles, Phoenix, Prescott, Safford, Tempe, Tombstone, Benson, Tucson, Wilcox, Williams, Winslow, Yuma 2; value of churches, $95,000; value of parsonages, $21,500; value of other property, $10,000; value of school property, $10,000; total value of property, $136,500.

Baptist.—Ministers, 16; members, 686; increase in membership during the past year, 58; Sunday schools, 12; attendance, 789; increase in attendance during past year, 56; number of churches, 15; where located—Benson, Buckeye, Douglas, Mesa, Naco, Palo Verde, Phoenix, Prescott, Safford, Shiloh, Tempe, Tucson, Upper Verde, Yuma, Salt River district; value of churches, $3,550; value of parsonages, $2,000; total value of property, $5,550.

Methodist Episcopal, South.—Ministers, 8; members, 524; increase during the past year, 94; Sunday schools, 10; attendance, 646; Epworth

leagues, 5; members, 175; churches, 7; where located—Phoenix, Bethel, Tempe, Buckeye, Prescott, Solomonville, Nogales; value of churches, $34,500; value of parsonages, $5,450; value of other property, $2,550; total value of property, $42,500.

Methodist Episcopal, South (Spanish-speaking branch).—Ministers, 2; members, 91; increase during the past year, 20; Sunday schools, 3; attendance, 104; churches, 3; where located—Nogales, Phoenix, Tempe; value of churches, $3,000; value of parsonages, $1,500; total value of property, $4,500.

Christian.—Ministers, 2; members, 300; Sunday schools, 4; attendance, 200; churches, 2; where located—Phoenix, Bisbee; value of churches, $8,000.

Seventh-Day Adventist.—Ministers, 4; members, 170; increase during the past year, 30; Sabbath schools, 9; attendance, 200; schools, 2; scholars, 40; increase during the past year, 25; churches, 5; where located—Phoenix, Flagstaff, Sanches, Tucson, Nogales; value of churches, $3,600; value of parsonages, $200; value of other property, $3,000; parochial schools, 2; value of school property, $500; total value of property, $7,300.

Joint Lutheran Synod.—Ministers, 2; members, 58; Sunday schools, 3; attendance, 210; schools, 2; scholars, 48; increase during the past year, 26; churches, 2; where located—Fort Apache, San Carlos; value of school and church property, $3,500; value of parsonages, $2,100; value of other property, $500; parochial schools, 2; total value of property, $6,100.

Free Methodist.—Ministers, 6; members, 62; increase during the past year, 10; Sunday schools, 3; attendance, 75; churches, 2; where located—Phoenix, Liberty; value of churches, $4,300; value of parsonages, $650; value of school property, $4,950; total value of property, $9,900.

First Church of Christ, Scientist.—Readers, 2; members, 26; increase during the past year, 4; Sunday schools, 1; attendance, 20; churches, 2; where located—Prescott, Phoenix.

Congregational.—Ministers, 8; members, 384; increase during the past year, 73; Sunday schools, 11; attendance, 725; churches, 6; where located—Jerome, Nogales, Prescott, Tempe, Tucson, Tombstone; value of churches, $36,800; value of parsonages, $3,000; total value of property, $39,800.

INDIANS.

The progress made by the different Indian tribes in the Territory during the year has been most encouraging. The Indians have shown surprising thrift and energy in their work, having taken up methods of industry with success and built homes for their families. There are few hostile Indians at the present time in this Territory. Their hostility consists merely in discontent, which is not at all lasting.

Additional facilities for widening the scope of the work in hand have been given to the different agencies. While the greatest effort is embraced in the work of the Government, there are a number of missionary schools in Arizona, among them the Tucson Indian Training School, under the control of the Woman's Board of Home Missions of the Presbyterian Church. This school was opened in 1888 for the Papago and Pima, and has done a great deal of good work since that time.

The principal buildings on the campus are the girls' home, a two-story frame building; the boys' home, a group of one-story adobe buildings; and the superintendent's home. The farm is 1 mile west from the school.

The school is a home. The girls do all the housework, the cooking, and the washing and ironing, and they make and mend clothing for themselves and the boys. Opportunity to work in every department of the home is furnished during the school year. Thus, if a girl remains in school for one year only she receives a training which usually transforms her character as a housekeeper.

Most of the boys become farmers when they leave the school, and they receive practical lessons in agriculture on the farm. The board is furnishing a large pumping plant for the farm, and gardening will take an important place in the boys' training in the future.

In this school the Bible is the principal text-book. The literary course is similar to that used in the Government schools, and extends through the grammar grade of the public school. A number of pupils receive instruction in music.

HOPI INDIANS.

The Hopi training school is located 85 miles north of Holbrook, the nearest railroad station. The attendance during the year has been excellent, averaging 195, in spite of the scarlet fever which raged for the last six months of the year. One hundred cases occurred and only 6 deaths, some of which should not be charged to scarlet fever entirely. Agent Burton says that most Indian children are diseased in some way, and the Hopi and Navajo are no exception to the rule. Two classes have been transferred to nonreservation schools—one to Chilocco and one to Riverside.

The work of the school has been good, the beautiful new schoolhouse erected making a striking contrast to the mud shacks formerly used.

At the Polacca day school the attendance is about 45, composed mostly of small children. Every child of school age in the three villages which support this little school are either in that school or at the Hopi boarding school at Keams Canyon, 15 miles away. The people are contented to send their children to school, and there is every promise that this mesa is taking on civilization rapidly.

A large well, 10 feet in diameter, has been dug and walled up solidly with stone. This will supply the school with ample water for its needs. A good bath house and waterworks system will be put in the coming summer, which will make Polacca one of the finest schools in the Indian Service.

The Mesa day school is located 20 miles from Keams Canyon, the seat of the agency, and is the second largest school of its kind in the United States. There are three school buildings and the employees' cottage. The attendance has not been so good as in the past, dropping from something over a hundred to about 84, owing to the transfer of pupils to Keam's Canyon and to nonreservation schools, and a failure to encourage and influence attendance.

The Oraibi day school is located 35 miles from Keams Canyon, and is the largest day school in the United States. The attendance has averaged over 160 for the entire year.

One new stone building was completed during the year, and the

teacher, with all his other duties, with the help of the teamster, built the walls of a large stone building 18 by 40 feet, and it only needs the roof and doors to make it a beautiful cottage for employees. A large stone schoolroom was built a year ago for this school, which gives ample room for the 170 children enrolled.

The water supply here is inadequate, water being hauled for drinking purposes 1 mile from a well in the valley. Two large wells 16 feet in diameter, one for the school and one for the Hopi, furnish water for laundry purposes, but it is not good for drinking.

The following table shows the increase in attendance at the various schools under the Keams Canyon Agency:

	Average attendance.		Increase.
	1899.	1904.	
			Per cent.
Hopi training school	83	195	135
Polacca school	24	45	90
Second Mesa day school	19	84	342
Oraibi day school	23	164	613
Total	149	488	
Average net increase			288

The tribunal known as the Indian courts has accomplished good work during the year, relieving the agent of many petty details. There have been no serious crimes or misdemeanors committed. This court deters a great deal of crime.

Two missions have been maintained by the Woman's Baptist Home Mission Society, one at Polacca and the other at the second Mesa school. Considerable progress has been made toward the conversion of the Indians, especially at Polacca.

The Mennonite Mission Board maintains a mission at Oraibi under charge of Rev. J. B. Frey. A commodious mission chapel has been erected, where services are regularly held.

Three trading posts are kept on the reservation by white men. All have done a good business and the Indians have been treated fairly. Several young Indians have started trading posts themselves and are doing fairly well. This places them in an independent sphere and causes them to depend more and more upon their own efforts to get along. It is also the most powerful factor toward civilization.

The field matrons have done a great deal of good. At the Polacca, Miss Sarah E. Abbott's work shows for itself, in the clean homes and yards and the higher life of the people. At Oraibi, Miss Miltona M. Kieth is striving against almost despairing odds to elevate the people and encourage clean homes and better living. At this village, however, 1,000 people are huddled together in a small place. A great part of them are so-called hostiles, and it is slow work getting them to change their customs of a thousand years. Little by little her faithful work is telling.

The earnings of the Indians during the year were as follows:

Sale of wood	$1,080
Sale of coal	600
Sale of beef	2,000
Irregular labor	2,700
Freighting	2,525
Total	8,905

To this should be added moneys earned by freighting for traders, sale of baskets, plaques, blankets, which will amount up into the thousands.

The scarlet fever at the Hopi school also swept through the Hopi villages, and owing to the filthy homes and little care shown the sick, many children died. Every effort was made by the physician but as he had nearly 100 cases in the Hopi school he had his hands full without the villages. The field matrons did what they could to alleviate the condition.

Better and cleaner homes are in evidence; better and more civilized clothing is worn; larger houses with good doors and glass windows are being built by the Indians with their own money and labor; the medicine man is disappearing; and the dances are decreasing. Several young Indians will vote this coming election, being able to fulfill every requirement of the law. They can read and speak well the English language; they can hold their own in commercial pursuits, and they can make a good living for themselves and their families.

Mr. Charles E. Burton is the superintendent in charge of the Hopi Agency, with headquarters at Keams Canyon.

PIMA INDIANS.

The Pima Agency is located at Sacaton, 16 miles north of Casa Grande, a station on the Southern Pacific Railroad. Casa Grande is the railway and telegraph station and is connected with Sacaton by a daily stage, carrying the mail every day except Sunday.

The jurisdiction of this agency extends over three distinct reservations: Gila River, Salt River, and Gila Bend, peopled by three tribes, Pima, Maricopa, and Papago. The population is as follows:

Gila River Reservation	3,860
Salt River and Lehi Reservation	650
Gila Bend Reservation	154
Nomadic Papago (about)	1,850
Total	6,514

The progress of the Pima on the Gila River Reservation during the past year has been steady in spite of the long continued drought. No rain has fallen for more than a year, consequently they were cut off from agricultural pursuits but found employment in various ways. The men worked on the railroad, on farms, and in the adjacent towns. The building of the Tonto reservoir afforded work for many. The women do laundry work, cook, raise chickens, make baskets, and in many ways keep the wolf from the door. Ninety-five per cent are self-supporting, while 5 per cent receive rations. Among the latter are the sick and aged. There has been no starvation on this reservation as the Indian Office provides for the destitute. The pumping plant installed at Sacaton has proven a wonderful success, and if similar plants are established on the reservation the Indians will be independent.

There is a noticeable improvement in their dress, manner of living, and desire for articles of furniture. Packing boxes are collected and utilized, homemade chairs, tables, beds, etc., are seen everywhere. The parents recognize the value of education, and all healthy children of school age are in school. Nearly all of these Indians belong to the church. When the bell rings on Sunday afternoon, no matter how

warm the weather, large numbers of clean, orderly men, women, and children troop by to church and can be heard singing hymns during the afternoon hours.

The boarding school at Sacaton is in a flourishing condition. The capacity of the school is 250, but during the spring and fall, when it is necessary to sleep out of doors, 281 are accommodated.

Commissioner Jones, on a recent trip to Sacaton, said, "the Sacaton farm is the best and cost the least of any farm in the Indian Service."

The pumping plant was completed in January and consists of five drilled wells connected with each other; the water is raised from them by one large pump. Inspector Code and Mr. F. H. Newell, of the Geological Survey, visited the plant when it had been in operation about four months, and were more than pleased. The important thing demonstrated both by this and other plants is that there is an immense underflow both in the Sacaton and Salt River valleys, and that it seems to suffer no diminution from the constant drain upon it of these large plants. It is therefore the most encouraging feature in the project to build many similar plants for raising the underground flow by power to be generated at the dam site.

The Sacaton plant now furnishes water approximately for 300 acres of land, and 200 more will be brought under the same plant, making in all 500 acres watered by this plant, the initial cost of which was about $15,000. The running expense of this plant is from $1.50 to $1.75 per acre-foot of water raised. Four acre-feet is a liberal annual supply for irrigation purposes, making the water cost from $6 to $7 per acre per annum. Seven tons of alfalfa to the acre will be raised every year. The quality of the water is shown by analysis to be vastly superior to that in the Gila River. The plant has been running fourteen hours a day for six months, and the supply is not diminished in this the dryest season known in Arizona for years.

Through this plant many acres of worthless desert lands have been converted into a farm of which we are justly proud. It is truly a wonderful sight. Thirty miles out on the hot sun-baked desert, field after field of alfalfa, sorghum, wheat, young fruit trees, vegetables, melons, etc., meet the eye. In February the first plowing was done and water applied to land that had not been wet for years, except by occasional showers. To-day the Indians there have raised food enough for school and agency stock for the next fiscal year, and $1,000 worth of hay has been sold. Heretofore $1,000 has been expended for hay. The garden has furnished vegetables for the children's table, and the cold storage is full of melons. The fine well-fed cattle are the best to be found in the country, while the pigs would take a prize in any Eastern State.

This fine farm is a model for the older Indians and furnishes valuable training for the boys. We are handicapped in the fact that this being a reservation school the boys are too young to handle the work. The capacity of the school should be increased to 350, to include boys over 16 years of age to receive the benefit of this most valuable industry, for there is no other place in the Southwest that can give them the same advantages. The Pima can not live in the colder climates, therefore he should be given a chance for a livelihood in his own country, where he will have health and strength. To colonize the Indians, giving each individual a certain number of acres under a pumping plant, seems to me an excellent scheme and the only way to help them to an

independent mode of life, as they are naturally an agricultural tribe and require an outdoor life.

The boys also receive good training in carpentry, blacksmithing, harness making, etc. Right here I wish to say that boys who go to the large training schools, should be taught trades useful to them in their homes. There are large numbers of returned students on this reservation who are tinners, shoemakers, bakers, and machinists, but in looking for an assistant farmer but few could be found who could milk a cow. When application is made for a boy to work out, nearly always "one who can milk" is desired. The Pima is a born farmer; he will never be a machinist or a tinner.

The girls are taught cooking, sewing, laundrying, housekeeping, basketry, lace making—all that pertains to good housewifery and clean homes.

The literary department did excellent work, gaining ground lost in preceding years. The kindergarten class is a pleasing feature of the model school in the St. Louis Exposition.

Six-day schools have done well, and the beneficial results are apparent in their vicinity. Five hundred children have been sent to non-reservation schools, chiefly to Phoenix.

St. John's mission school at Gila Crossing, in charge of the Franciscan Fathers, reports no sickness, good conduct, and a large attendance during the year.

The Indian court, composed of three honest, intelligent Pima, are of great help in arriving at a just decision, as they understand the language and do not have to depend upon the truthfulness of the interpreter.

The police, all full bloods, can be relied upon to carry out instructions, interpret, and keep order on the reservation.

The Indians on the Salt River Reservation have a little water, but not nearly enough for their lands. They manage to make a living, receiving no rations at all.

The additional farmers are of great help to the agent in looking after affairs in remote parts of the reservation. They compel the Indians to use every drop of irrigation water, to plow properly, and keep their farms in good condition. They become personally acquainted with the sick and infirm, and can not be imposed upon for rations. Through them the agent can arrive at a more accurate census, and their services are valuable in accompanying and looking after the interests of large numbers of Indians working at a distance from the reservation.

The outing matron reports as follows:

When I took charge of my position it was considered to be a much needed one by all who had the interests of the Indian youth at heart.

They hired out in families where they were allowed to be out at any hour of the night they chose. After having oversight of them during the last year and a half I have but very little fault to find with the reservation working girls; but few changes of place have been made without first consulting me. The boys have been a little more troublesome, but are filling good positions very satisfactorily. Any Indian can find work in the Salt River Valley if he understands English. Both sexes make good help in the house and on the farm. The girls are natural nurses and are fond of children. The boys are handy with horses and barn work. I have a good boy who earns $14 a week the year round in a tailor shop. The wages of a girl is from $8 to $23 a month. The boys range from $10 to $56 per month. The demand for help is far in excess of the supply. I thoroughly enjoy my work and feel that much good has been accomplished.

Mr. J. B. Alexander is the superintendent of the Pima Agency, with headquarters at Sacaton.

NAVAJO INDIANS.

The Navajo Agency is located at Fort Defiance, Ariz., 30 miles northwest of Gallup, N. Mex., which is the railroad and telegraphic station, and which is now connected with the agency by a telephone line. This agency comprises the south half of the Navajo Reservation, and something like 12,000 Indians are located there.

The Navajo is a superior Indian, an energetic worker, and is generally peaceable and quiet, and is making some progress. Their reservation is a very large area of barren country, fit only for grazing, with the exception of small areas in various places where the land can be irrigated. Such places are made use of for farming, while the flocks of sheep and herds of cattle graze on the other territory, and some of the herds are kept off the reservation.

The Navajo are employed at all places in this country where labor is desired. They receive employment in the beet fields, at various mines and on the railroad, and generally are given the preference over other Indians and the Mexicans. At the present time quite a number of the Navajo are employed at the Zuñi Reservation on the improvements the Government is installing there. The agent encourages the Indians to leave the reservation and find employment where they can, and they seem willing to go most any place to secure work. The Government has paid the Indians for labor, beef, mutton, hay, and freighting during the year as follows:

Irregular labor	$2,383.56
Beef and mutton	5,843.24
Hay	293.90
Telephone poles	1,222.25
Wood	1,480.00
Hauling coal	1,565.85
Freighting	3,779.64
Total	16,568.94

The greatest source of income the Navajo has is from his sheep, goats, and sale of the Navajo blanket. In the neighborhood of $500,000 are obtained from these industries. The Navajo blanket has become well known and is in demand everywhere.

During the year an adobe cottage and frame barn were erected at Chin Lee, the former at an expense of $866 and the latter by agency employees at no expense to the Government; a stone cottage at an expense of $2,556 was erected at the agency; and a telephone line at an expense of about $2,700 built between the agency and Gallup; the roads in the vicinity of the agency and Little Water school have been improved and other minor improvements made at the agency. The agency sawmill has been put in working condition and has sawed first-class lumber—221,000 feet during the year. The labor in making these improvements has been performed largely by the Indians. A number of the Indians are excellent stone masons, some do good adobe work and some are learning to do carpenter work.

The Little Water school, under the supervision of Mrs. Emma De Vore, has done good work. The attendance has been large and

could have been larger had the capacity and conveniences permitted. This school is located 35 miles northeast of the agency and the plant consists of one stone and three adobe buildings, one of the adobe buildings containing dining room, kitchen, sewing room, one schoolroom, and employees' rooms, having been completed during the year. By the addition of this building the capacity of the school was increased from 80 to 125. A new barn is in course of construction, a new laundry building was being erected, but on June 17 a gasoline explosion occurred in the pump house and the result was the destruction by fire of the new laundry, old laundry, and pump house buildings. The school needs more buildings, a good water system, and improvements in the sewer system.

The Navajo school is located at the agency and has a capacity of about 180, but during the year the enrollment has been 280, with an average attendance of 211. Good progress has been made in all the departments of this school, considering the fact that a large majority of the pupils at the beginning of the year could not speak English. A number of the boys were given instruction in blacksmithing, wagon work and carpentry, shoemaking, gardening, fence building, and engineering, under the direction of agency and school employees; while the girls received training in cooking, housework, sewing, weaving, etc., under the supervision of the matrons, cooks, laundress, seamstress, and weaver.

During the year the garden has been enlarged by building a new road and setting the fences out to include some good land through which the old road ran; a number of old, unsightly buildings have been torn down and removed; the grounds have been inclosed by woven-wire fencing, thus throwing the traffic back of the buildings instead of across the school grounds; steam machinery has been installed in the laundry; two respectable looking coal houses built; grounds improved and beautified; 1,400 feet of plank sidewalk built, and other minor improvements made.

The dining-room building should be enlarged so the capacity would be 250 instead of 140. By this improvement needed dining room and kitchen for pupils and mess room for employees would be provided. A school building containing five class rooms and assembly hall, a hospital building, a barn, and a girls' dormitory building should be erected. A complete sewer system, a heating plant, and an electric-light plant should be installed, land for farming obtained and land for grazing purposes inclosed by fence. The agency barn should be converted into shops for blacksmith and wheelwright, and the agency shop into carpenter and shoe shops for school. Estimates for most of these improvements have been filed with the Department, and favorable action will probably be taken on part or all of the matters in the near future.

At St. Michaels, 8 miles southwest of the agency, is located a school under the supervision of the Catholic Sisters. They have a very nice plant, take care of about 80 Navajo pupils, and have done excellent work.

As an indication that the Navajo is becoming more favorably impressed with the benefit of education, 98 pupils have been transferred from the two schools and direct from the reservation to nonreservation schools, and from 150 to 200 pupils have been placed in the Albuquerque school by the Navajo residing off the reservation.

The health of the Navajo has been usually good this year, no serious epidemics having visited them. Tuberculosis in its varied forms is the prevailing disease and is due to heredity; they are bothered more or less with rheumatism, and diseases of the eye due to the sand-laden winds and to the fact that in heating their hogans as they do their eyes are injured by the smoke. These troubles will become less as they improve their way of living, which improvements depend largely on the example of the returned pupil.

The sanitary condition of the school has been much improved during the year, and with the further improvements planned can be made nearly perfect.

Rev. C. H. Bierkemper, of the Presbyterian denomination, is located at Ganado, 35 miles west of the agency. Rev. Mr. Bierkemper, in addition to conducting a day school part of the year, has assisted the Indians in improving their roads, developing water for themselves and their stock, and in other ways. He has considerable influence with the Indians and is doing excellent work.

Rev. R. B. Wright, of the Baptist faith, has charge of the mission work at Two Grey Hills, about 45 miles north of the agency, while Rev. H. J. Freijling and Rev. Mr. Brink, of the Dutch Reformed Church, are located, respectively, at the Navajo and Little Water schools.

Mrs. Henrietta G. Cole, field matron, is located at Chin Lee, about 50 miles northwest of the agency. Mrs. Cole is doing excellent work.

An irrigation engineer has been employed to make plans and estimates for various irrigating projects on the reservation, and it is hoped that a portion at least of these proposed improvements will be made during the current year. The employment furnished the Indians by such work would be of great immediate benefit to them and the improvements made would provide permanent homes for a large number.

Mr. Reuben Perry is the superintendent and special disbursing agent of the Government, from whom the information given in the foregoing statement was obtained.

MOHAVE AND CHEMEHUEVI INDIANS.

The Colorado River Reservation, the home of 650 Mohave, extends for 60 miles along the Colorado River and contains about 240,000 acres. A portion is subject to the annual overflow of the Colorado River, but the larger part requires irrigation to raise a crop. The soil is as fertile as any in Arizona, and crops will grow the year around. All fruit trees indigenous to southern California thrive here.

Wheat is the most successful crop of the Mohave, but barley and corn do well. The vegetables usually grown are beans, melons, and pumpkins. A centrifugal pump recently installed irrigates about 500 acres.

The Government irrigation works, projected to begin at Needles and extend down the river, will be of great benefit to the Mohave Indians. Nearly the entire valley traversing their reservation can be irrigated at small expense throughout the year with the supply of water furnished by means of dams in the river. It is estimated that the lands susceptible of irrigation in the Colorado River Reservation would, under cultivation, yield sufficient products to support all the Indians in the Territory of Arizona.

The Fort Mohave Indian School is maintained by the Government at old Fort Mohave. There is a small reservation there which has been occupied by the Mohave and Chemehuevi Indians for generations. There are but a small number of the latter tribe left.

While many of the Mohave Indians still wear long hair and a few still paint their faces, they have made very rapid progress in civilization during the past fifteen years. This progress is due very largely to the influence of the Fort Mohave Indian School. The young people nearly all speak the English language, the middle-aged understand English fairly well, and the aged are rapidly passing away. They nearly all wear citizen's clothing and are becoming enlightened upon most of the vital questions pertaining to the progress of mankind. They are fairly industrious and furnish a large part of the labor essential to the progress and enterprises of this section of the country. The mortality rate seems to be quite high, and without a doubt the Mohaves are decreasing in numbers. An accurate record has not been kept in the past, but in the future the school proposes to keep accurate statistics.

The Fort Mohave Indian School, of which Duncan D. McArthur is superintendent, is the pride of the Mohave tribe and a credit to the Government. In it the Mohave children are trained in the white man's better ways. Those completing the course go out to become leaders among their people, disseminating the information the tribe requires in its advancement toward citizenship. While, from lack of means and the retarding influences of tribal manners and customs, these young people must accommodate themselves to the necessities of their environment, yet to a great extent they are raising the moral and intellectual status of their people and engaging with great credit to themselves in the various avenues of industrial work that afford them employment. A number of Mohave Indian girls from the school are constantly employed for brief periods of time in good homes in Los Angeles, Cal. They are very much desired as helpers in such homes, and the training they thus receive will undoubtedly prove to be a potent factor in the improvement of the Mohave Indian homes when these girls eventually become wives and mothers.

During the past fiscal year the Fort Mohave school plant has been enlarged and improved. The older buildings have been thoroughly renovated and put in excellent condition. A fine new brick school building and assembly hall and a new dining room and kitchen have been erected. Invitations for proposals for the erection of a new brick hospital are now being circulated.

The present enrollment of the school is 223. The average attendance during the fiscal year 1904 was 210.

An irrigation ditch was constructed across the school reserve during the past year for the purpose of irrigating lands farther down in this valley. The ditch is not yet in first-class condition, but if properly managed and dredged as sediment settles in it there is good reason to believe that it will prove to be a success, in which case there will undoubtedly spring up in this part of Arizona one of the most thrifty agricultural communities in the Territory, for the soil here is fertile, there is a large area of land that can be irrigated, and water for irrigation is abundant. The school anticipates the irrigation of 1,000 acres by means of laterals from the above-mentioned canal.

If the proposed irrigation works are established by the Government

at Bulls Head, the lands of the Fort Mohave School Reserve will be very valuable and this school will be placed upon a self-supporting basis and will undoubtedly become one of the leading Indian schools of the country.

SAN CARLOS AGENCY.

The San Carlos Reservation embraces about 2,800 square miles and is bounded on the north by Salt River, which separates it from the Fort Apache Indian Reservation.

The Indians residing on the reservation are divided as follows: Tontos, 667; Coyoteros, 489; Mohave, 55; San Carlos, 1,066; total, 2,275, of which 90 are ex-students of nonreservation schools and 592 are of school age. These Indians since the Government has stopped the issue of rations have taken readily to work, and during the past year have been engaged in building roads, irrigation ditches, improving their farms on the reservation, and working in the mines and on railroads off the reservation. They have conducted themselves in an orderly manner, the few disturbances that have arisen from time to time being caused by the desire of the Indians for liquor and the supply of the same by degenerate whites.

The San Carlos boarding school has an attendance of 100. Rice bonded school has an average attendance of 209. The Lutheran mission school has 20 pupils.

Among the improvements of the year is an excellent wagon road, which has been built from San Carlos to Fort Apache.

Indians' farms have produced during the year the following crops: Wheat, 3,312 bushels; barley, 4,784 bushels; corn, 1,957 bushels; cabbage, 64 bushels; pumpkins, 847 bushels; melons, 1,000 bushels. On account of the drought the hay yield was light.

The Apaches have few cattle. During the past year 18,260 head have been pastured on the reservation at $1 per head, the Indians receiving the benefit.

Mr. Luther S. Kelly is the Indian agent in charge at San Carlos, having recently taken charge of this important post.

APACHE INDIANS AT FORT APACHE INDIAN AGENCY.

The White Mountain Apaches are under the supervision of this agency, which is located on the White Mountain Reservation, in northeastern Arizona.

On account of the unusual drought it has been a hard year for the Indians of this agency. They usually sell wild mountain hay, from which they realize about $20,000 annually; but during an ordinary year they could sell $50,000 worth of this hay if they had a market for it. This year the Indians received no more than $10,000 for their hay. However, they have sold 2,000 cords of wood to the military at Fort Apache, for which they were paid $6,000.

These Apaches are good laborers when wisely directed, but it is difficult to get them to leave the reservation to work anywhere. They cling tenaciously to the mountains as their own home.

Of the 400 head of cattle bought for them with their grazing permit money the percentage of loss is less than among the cattle of the white permittees about them. It was predicted by the pessimistic that these Indians would soon kill their cattle, but such is not the case. They

have done as well as white people would have done under the same circumstances. It is true that they are careless, thoughtless, and wasteful, but their education and condition have made them so. They are very superstitious and have great faith in the "medicine man." The Indian medicine men are a menace to civilization and to the schools. The agent states that they should be sent to another reservation where they would have no influence. The bonded officer at the agency could be empowered to remove any Indian who persists in misleading his people in these so-called medicine practices. It is hard to govern Indians as long as they have such faith in these frauds. Even the Indian police are afraid to arrest them, fearing that the medicine man will cause some demon to take hold of them.

The agent has granted grazing permits to owners of cattle and horses to the extent of about 6,000 head, and this limited grazing has in no perceivable way affected the mountain vegetation. Stockmen know that the grazing is much better on the reservation than off of it, hence twice as many applications for grazing permits are received as are granted. Some of the stockmen have suffered the loss of quite a large number of cattle from slaughter by Indians. The Chiricahus Cattle Company estimate that they have lost $1,500 worth of cattle this year from Indian depredations. Hence it will be readily seen that there is much room for improvement in the morals of these Indians.

About 90 per cent of the number of males wear citizen's clothing, consisting of overalls, shirt, and hat; the female population wear flashy colored dresses made in their own peculiar style. They like harp contrasts in the colors of their dresses; the older women are usually very dirty and their dresses are scanty and poor.

With rare exception the Indian women are opposed to the school and civilization, and the children hear nothing in the camp but opposition to the schools. The men are not so much opposed, at least they do not manifest it so plainly. The Indian boys are much brighter and more easily taught than the girls.

According to the last census there were 551 Indian children of school age, and of this number about 220 are attending school. The agency has a fine electric-light system, a splendid water and sewer system. The Department has begun the construction of suitable stone buildings for the schools. At least three more buildings of this kind should be erected during the ensuing year for the training of Apache children.

Fort Apache has a splendid commanding officer in Major Bishop, who is cooperating with Agent C. W. Crouse in many ways that are helpful to this tribe.

PHOENIX INDIAN SCHOOL.

The Phoenix Indian industrial school, of which C. W. Goodman is superintendent, was established and a superintendent appointed in January, 1891. The school was opened in the West End Hotel the following September, with 31 boys. The number was soon increased to 42 boys, which taxed the capacity of the building. Mr. Hugh Patton, a Pima Indian, now the day school teacher at Gila Crossing, was the first teacher. May 6, 1892, the school was transferred to its permanent quarters on the 160 acres of land 3 miles north of Phoenix. This quarter section was valued at $9,000, of which the Government paid $6,000 and the citizens of Phoenix donated $3,000.

Since then the school has grown until there are now 30 buildings

for the pupils and employees. The extensive grounds are well cared for and quite ornamental, and the school is quite a resort for Phoenix people and their friends.

The total number of pupils enrolled during the year was 872, with an average attendance of 716. About twenty different tribes of Indians are represented at the school, among which may be mentioned the Pima, Maricopa, Papago, Apache, Navaho, Hopi, Yuma, Mohave, Pueblo, Mission, Klamath, and Hupa, the greater number of pupils coming, of course, from the reservations of Arizona.

Special attention has been paid to the industrial training of the pupils. Under trained instructors the boys are taught carpentry, wagonmaking, farming, gardening, dairying, painting, shoe and harness making, engineering, tailoring, baking, and other useful occupations. The girls are instructed in cooking, sewing, laundering, nursing, and general housekeeping.

An industrial cottage, in charge of one of the matrons, has been set aside for the purpose of instructing girls in general household duties. About six or eight girls of various ages are detailed here for a certain length of time, and they are taught such work as is required in the average home and such a manner of living as the Indian pupils, with proper energy and ambition, may reasonably hope to attain. In connection with the regular housekeeping they have the care of a cow and some poultry.

All the pupils receive instruction in the class room one half day and the other half is devoted to industrial training. Both the boys and the girls receive military drill, and the boys especially are given careful instruction in military tactics as per the Manual of Arms used in the United States Army.

Among the improvements of the school during the year may be mentioned the erection and completion of a new hospital, addition to the boys' dormitory, a fine dining hall and kitchen, a new dairy barn with all modern conveniences, the laying of 660 square yards of concrete sidewalks, the installation of a new ice plant with a capacity of 4 tons of ice per day, the drilling of two wells on the school farm, which supplement the supply of water from the irrigating canals, besides many improvements to the buildings and grounds in general.

A creditable exhibition of some of the work done at this school was sent to the World's Fair at St. Louis this summer, and may be seen in the Arizona exhibit in the Educational Building. This exhibit includes a beautifully hand-carved oak library desk, different types of horseshoes, a carved picture frame, rugs, and some excellent pieces of embroidery and fancy work, as well as a fine exhibit of class-room work and numerous photographs of the school.

The health of the pupils has been good, and as a class they have been happy and contented.

Four boys and four girls, representing seven different tribes of Indians, completed the grammar school course in June. Several of these expect to go to Hampton Institute to complete their educations.

Our Indian school band, which received many complimentary press notices in regard to the gentlemanly conduct of the boys and the high class of music rendered on their tour of Arizona and California last summer, is receiving still greater recognition this summer. The band has been in California for about two months this summer, and every-

where it has given entire satisfaction and won the admiration of those who have heard it.

Through the efforts of Hon. Frank Mead, supervisor of Indian reservations, the old military post at Camp McDowell has been converted into headquarters for a farmer and day school teacher. The improvements near this post have been purchased by the Government of the white settlers, and the land has been apportioned to deserving Mohave-Apache Indians, who have been supplied by the Government with a few plows and farming implements in order that they may cultivate their lands.

There are now living on this reservation 191 Apache Indians. The number of acres of land cultivated by these people during the year was 256. The produce raised during the season is estimated as follows:

Wheat	bushels	23
Corn	do	607
Potatoes	do	17
Hay	tons	36

A large number of watermelons and muskmelons.

This is evidently only a fraction of what is needed for their support, but the Indians are earnestly trying to profit by the generosity of the Government and are encouraged to greater efforts for self-support in the future.

Women of this tribe are noted for their fine work in basketry, and during the year sold above $2,000 worth of baskets. A day school was established in January. The average attendance for the last month in the school year was 18. The Camp McDowell Indian Reservation has been attached to this school for purposes of administration.

At the present time the entire farm consists of 240 acres, a quarter section lying under the Grand Canal. A tract of 80 acres, 1 mile east of the school, is the new farm, which carries a water right in the Arizona Canal, although 10 acres of it lie under the Grand Canal also. Here the soil is adapted to gardening. Vegetables and melons are cultivated with a fair measure of success.

Eggs, milk, and hay were the farm products of the year. Recently special attention has been given to poultry.

Health and deportment of an Indian school require eternal vigilance. Happily the first is in excellent condition, no epidemic having invaded the premises. While occasional misdemeanors are discovered and punished, unremitting care has resulted in much-improved conduct.

The Indian school band, which is regarded as the best in the service, has recently made a tour of Arizona and California, everywhere receiving complimentary press notices upon their gentlemanly appearance and conduct and upon the style and class of music rendered.

SAN XAVIER RESERVATION.

This Reservation embraces an area of 105 square miles in Pima County. The chief occupation of the Indians is agriculture, in which they are making steady progress, although they have experienced many drawbacks. They are industrious and economical, spending the money received from their crops on improved machinery and in building new homes. The agency is at San Xavier.

COUNTIES.

On February 24, 1863, the Territory of Arizona was set aside from New Mexico and became an organized political division. The first legislature met a year later and organized the Territory into four political divisions, forming the counties of Yavapai, Mohave, Yuma, and Pima. The population at that time was about 8,000. The Territory was unexplored, inhabited by hostile Indians. The nomenclature of the counties shows the location at that time of the different tribes, the legislature readily accepting the Indian names as the most appropriate designations of the separate divisions. Later on this same spirit controlled in the naming of Apache, Navajo, Maricopa, Pinal, Coconino, and Cochise. Santa Cruz and Gila got their names from rivers, and Graham indirectly from a gallant army officer by that name who commanded United States troops in the early days. This name was originally given to the range of mountains traversing the central part of the county, and when the county was formed it was handed down as the proper name for it to bear.

Yuma County has retained its original boundary from the time of its formation in 1863, and it is the only county in the Territory that has done so. Mohave County has been least molested of all the other counties, having given over a portion of its area to what was known as Pah Ute, a county created by the legislature of 1865. Utah, however, by an act of Congress, established its southern boundary to include the principal settlements of the new county along the Muddy River, and in 1871 the law creating this county was repealed, and Mohave County was left with 13,421 square miles, the second largest subdivision in the Territory.

From Yavapai and Pima nine counties were formed. Apache, Coconino, Maricopa, and Navajo sprang directly and indirectly from Yavapai, and Cochise, Pinal, Gila, Santa Cruz, and a large part of Graham, from Pima. The northern part of Graham was formed from a part of Apache County, which was originally Yavapai County's territory; hence Graham must be credited to both Yavapai and Pima.

The last encroachment on Pima County was in 1898, when Santa Cruz County was formed from its southeastern portion. The new county is the smallest in the Territory, having an area of 1,212 square miles; yet it is equal to the State of Rhode Island in size.

In 1871 Maricopa County was organized, and Pinal County was also created that year; Maricopa having been sliced from Yavapai and Pinal from Pima, the area in square miles of the former being 9,354 and of the latter 5,210. In 1881 Graham, Gila, and Cochise were created, Apache having come into existence three years prior to the advent of the three counties mentioned. In 1895 Navajo County was formed from the western portion of Apache County, with an area of 9,826 square miles.

The mining counties are Cochise, Graham, Yavapai, Yuma, Pima, Pinal, Santa Cruz, Mohave, Gila, and Maricopa. There are some mining districts in Coconino County, but Navajo and Apache do not claim prominence from this source. They are chiefly stock-raising and agricultural counties.

APACHE COUNTY.

This is one of the largest counties in the Territory, having an area of 12,000 square miles.

The Navajo Indian Reservation takes up about 5,000 square miles of the northern part, while the Apache Indian Reservation takes up about 500 square miles of the southern part. The Black Mesa Forest Reserve, which borders on the last-mentioned reservation, takes up most of the valuable forests as well as a great part of the best grazing land. Between the reservations the settlements are located, inhabited by a progressive, law-abiding, industrious people, gathered together from all quarters of the globe. The population of Apache County is between 9,000 and 10,000. St. Johns, the county seat, is the largest of the towns, with a population of about 1,200. Following in point of population are Concho, Springerville, Eagar, St. Michaels, Nutrioso, Alpine, Greer, Navajo, Adamana, Allantown, Houck, Ganado, and a few smaller settlements, supported by agriculture or stock raising.

A major part of the petrified forest lies within the borders of the county, and everywhere can be seen evidences of a prehistoric civilization. The pueblo ruins, cliff dwellings, and irrigation systems show that at some remote time this county was thickly populated.

The taxable property will reach this year the $1,000,000 mark.

The financial affairs are in a healthy condition, the county having greatly diminished its bonded indebtedness, and is now running on a cash basis. Its liabilities are: Seven per cent bonds, $14,000; Territorial 5 per cent bonds, $43,439; total, $57,439. Its assets are: Cash on hand, $17,069.44; court-house and grounds, jail, safes, and furniture at St. Johns, $15,500; jail at Concho, $500; bridges and other property, $1,500; total, $34,569.44.

There are two reservoirs in the county, owned by private capital, with a total irrigation capacity of 35,000 acres. The droughts have seriously interfered with farming, as well as considerably damaging the stock industry. The stock industry of the county represents fully $350,000 of its taxable property.

The county supports 23 public schools, with an attendance of 890 pupils out of a census population of 955 of school age. The valuation of school property, which is exempt from taxation, is $12,434.

At St. Michaels the Franciscan fathers, under the patronage of Mrs. Catherine Drexel, are conducting a very successful school in the upbuilding of the Navaho.

The county has two weekly newspapers—the Snips-Herald, printed in English, and the Apachito, a Spanish publication.

The mining industry, aside from a small amount of gypsum mined for local use, has never been awakened into life. Prospecting of late has manifested that there are deposits of coal, gilsonite, silver, copper, and gold awaiting development.

COCHISE COUNTY.

Mining has given this county prominence throughout the United States, some of the largest producing copper and gold mines being located there. The mineral production is perhaps as large as any county in the Territory. Bisbee is the center of the mining activity which extends to all parts of the county. Douglas during the past

year has become the home of copper smelting in this county, the smelters of Phelps, Dodge & Company having been erected there for the reduction of all copper ores produced by their mines. Customs work is also done, lending an impetus to individual efforts throughout the southern portion of the Territory and northern Sonora, Mexico.

The population of Cochise County has greatly increased during the year, the gain being the greatest of any county in the Territory. Bisbee and Douglas have expanded during the year, and several new mining camps have shown increases in population. Tombstone, once the largest mining camp in the Southwest, is again taking an important place as a point of activity and development. Pearce, Willcox, Gleeson, Black Diamond, Benson, Fairbank, and many other towns, have also shown progress.

The Mormon settlers of the San Pedro Valley carry on extensive farming, and with their great energy and push have succeeded in making some substantial farms, which yearly give them profitable returns. A large number of wells have been sunk upon these ranches at St. David and other places south of Benson, and water thus obtained for irrigation is spread over large areas of fertile bottom lands. Benson, Fairbank, Tombstone, and other points, provide markets for the products, and great quantities of hay and grain are shipped to the larger markets. In the San Simon Valley artesian water was developed first in 1882, and a number of wells are successfully operated for supplying water for irrigation. The San Simon River also supplies some small ranches with water for farming. Some irrigation is carried on in the Sulphur Springs Valley by using water from the White River. Near Fort Huachuca ranchers take water from Babocomari Creek and from springs in the Huachuca Mountains and use it for small farming and domestic use. The St. David and Union ditches in the San Pedro Valley are the chief sources of extensive irrigation in the county.

Cochise County is one of the principal stockraising counties of Arizona. Great areas of fine ranges provide feed for stock throughout the more favorable years, and thousands of cattle and horses roam the ranges of this county. Cattle raising is carried on extensively by individuals and large corporations, and there are some of the largest ranches to be found in this county of any section of Arizona. It is regarded as one of the most favorable portions of Arizona for stock, and the industry is in a prosperous condition considering the extent of the drought of the past few years.

COCONINO COUNTY.

Reports do not indicate that there has been any material increase in the population of this county during the past year, owing to the fact that many stockmen and others have left the county and there is scarcely any land upon which settlement can be made, all available lands being held in reserve by the Government.

There is but little irrigation carried on owing to the scarcity of water. No extensive development of water has been attempted. There are at the present time no more than 15 ranches in the county.

At Lees Ferry water is obtained from springs in the Parish Canyon. The supply is more than sufficient for the small area under cultivation, and the crops irrigated are alfalfa, grapes, apples, and peaches. The

Indians at Supai obtain water from Cataract River, which comes out of the ground in torrents at the head of their camp. The flow is so great that the amount used for irrigation is hardly noticeable. Evidences abound showing that the Indians practised irrigation hundreds of years ago. The Fredonia Ditch receives its waters from Kanab Creek. Owing to the great width and sandy nature of the creek bed, the flow is very irregular. The winds drive the shifting sands across the stream, causing the water to spread over a large area, where it soon evaporates.

The stock-raising industry has suffered considerably owing to restrictions of forest-reserve acts and lack of snow and rain. Sheep raising is profitably carried on in the county, and great quantities of wool produced each year.

The lumber industry is prominent in Coconino County, large lumber mills being located at Flagstaff and Williams. An unlimited supply of timber is secured from the forests of the county.

Coconino is the largest county in the Territory, and includes within its boundaries parts of the Hopi, Navaho, Walapai, and all the Havasupai Indian reservations, the last named being situated in the Grand Canyon Reserve. The greatest length of the county is 185 miles, its greatest width 140 miles, and its area is nearly 19,322 square miles, being larger than the combined area of Vermont, Massachusetts, and Delaware. It is on the great Colorado plateau, and the greatest portion has an elevation of nearly 7,000 feet. Across the northern part the county is traversed by the Colorado and its tributary, the Little Colorado. These rivers have cut steep-walled canyons thousands of feet in depth, abounding in wildly picturesque scenery and wonderful gorges. Though carrying a large volume the rivers are useless for irrigation, as the waters are hundreds or even thousands of feet below the surface of the arable land. Owing to this lack of an available water supply the area irrigated is small and is confined to the localities of Lees Ferry, Tuba, Supai, and Fredonia.

Besides that flourishing Territorial institution, the Northern Arizona Normal School, located at Flagstaff, there are public grammar schools at Flagstaff and Williams, while at other settlements suitable teaching accommodations are provided. The Academy of the Nativity, a Catholic school under the control of the Sisters of Loreto, is also an important factor in local educational circles. Churches of the various denominations are to be found at Flagstaff, and Williams, and at Fredonia, and their influence for good is noted in the peace of the community.

Coconino hitherto unregarded as a mining county, has mineral deposits of great promise.

The Canyon Copper Company is rapidly developing its extensive property in Grand Canyon. Its claims are patented and will soon be producers.

Several deposits of copper ore between Williams and the Grand Canyon are being exploited, also a very large deposit north of the Colorado River in the southern end of the Buckskin mountains.

Near Flagstaff is the seemingly inexhaustible quarry of Arizona brown sandstone of which the Brown Palace Hotel, of Denver, the Los Angeles County court-house, and other notable buildings in the West are erected.

GRAHAM COUNTY.

The valuation of taxable property in Graham County shows an increase of over $1,000,000 during the past year. The tax rate is $4 for every $100 of taxable property, this including the Territorial tax. The total bonded indebtedness of the county is $192,864.70; the floating indebtedness is $28,036.17, making the total indebtedness $220,900.87. On January 1, 1903, the county treasurer reported $235,378.51 as representing the receipts for the year and the balance on hand.

Mining is the chief industry in the county, the great mines of the Arizona Copper Company, the Detroit Copper Company, the Shannon Company, and others being located there. Progress has been made in mining, and many new camps have appeared during the year adding their production to the yield of copper, gold, and silver. Graham is one of the greatest mining counties in the Territory.

In stock raising it takes lead with the biggest counties, many of the largest ranches in the Territory operating within the limits of its boundaries. Cattle feeding is an extensive industry in the valleys, and stockmen can depend upon excellent pasturage whenever the ranges become depleted from droughts.

Agriculture is engaged in extensively in the different valleys, the Gila being the largest and the most important in this respect. The products of the valleys find ready markets in the mining camps, the demand being great at all times for all manner of products. Hay and grain are produced in large quantities. In the upper Gila Valley Duncan and Franklin are prosperous settlements, while in the main valley of the Gila are the towns of Solomonville, the county seat, Safford, Thatcher, and Pima. There are large farms and cattle ranches in the county yielding profitable incomes to their owners.

The population of Graham County is between 17,000 and 20,000. There has been a considerable increase during the past year.

GILA COUNTY.

Gila County has had a more substantial growth during the past year than any heretofore. The population can only be estimated, but an increase is noticeable. The Old Dominion mine is working on an average of 350 more men than last year, and the influx occasioned by the building of the Tonto reservoir is estimated to be about 600.

Globe, the county seat, has expanded greatly, stores and dwelling houses for newcomers being almost unobtainable. Confidence in Globe's future as a permanent camp is generally expressed. The report of Gila County for the year 1903 shows Globe to have 3 banks, 1 electric-light plant, 1 waterworks system, 1 ice plant and cold storage, 1 natatorium, 11 mercantile establishments, 7 lodging houses, 2 drug stores, 2 hotels, 5 restaurants, 5 barber shops, 2 bakeries, 2 shoe shops, 14 saloons, 2 churches, 2 livery stables, 2 gentlemen's furnishing stores, and 2 millinery stores.

The cattle industry has suffered more this year than any during the past ten, owing to the protracted and severe droughts which have caused excessive losses to the cattle owners, as well as a reduction of the taxable property. Gila County is one of the largest cattle producing counties of the Territory. Beef is supplied to the home markets and stock is shipped to the Northern States and California.

The assessed valuation of live stock in the county for the year 1904 is as follows: Cattle, $253,380; horses, $48,060; goats and sheep, $36,452.

The mining industry of the county has made marked advancement. The consolidation of the Old Dominion and United Globe properties gives assurance of the permanency of these mines.

The Old Dominion Copper Mining and Smelting Company in the past year has laid about 4 miles of railroad track and equipped it with rolling stock. The new furnaces and converters will be completed by September 15, 1904, and the concentrators are expected to be running some time in October. The new shaft, destined to be 1,400 feet deep, is now down to the tenth level, where a station is cut and a new Prescott pump with a capacity of 1,500 gallons per minute installed, and one of like capacity will be put in on the twelfth level, thereby insuring the easy handling of the water in the mine.

When complete the Old Dominion plant will be one of the best in the Territory. The ore will be carried from the mine to the smelter in self-dumping cars of 50 tons capacity, run on a standard-gauge track. The smelter will have a capacity of 3,000,000 pounds of copper per month. The mineral deposits consist of large bodies of quartz on the upper levels, with large bodies of iron on the fifth level, while the lower levels, especially the eleventh and twelfth, carry immense deposits of sulphide ores, which are said to be of high value, running from 6 to 35 per cent in copper.

The United Globe mines consist of about 35 claims, the most of which are patented. The Gray, Hoosier, and Big Johnny are the principal mines of this group. The Gray shaft is down 865 feet in the main shaft and a winze has been sunk to a farther depth of 300 feet, making a total depth of 1,165 feet, which is the deepest working in the district, and shows conclusively that large ore bodies exist as depth is attained.

The Black Warrior Copper Company, Amalgamated, is inactive at present. This plant consists of a reverbatory furnace, leaching plant, concentrator, and acid plant, together with store, office, and warehouse buildings and dwellings. It is expected that active operations will be resumed during the year.

The Summit group of mines, owned by S. L. and C. W. Gibson, have attracted a great deal of attention, having produced from the grass roots. All development work has been paid for from the values of the ores as taken from the mine.

The Arizona Commercial Company, Globe-Boston Mining Company, Keystone Mines, the Arizona-Colorado Copper Belt and Gold Mining and Milling Company, and the Globe Mining Company (Mineral Farm) are all prominent mining companies in the district.

The Tonto dam and reservoir, which is being constructed about 35 miles north from Globe, will be one of the largest water storage reservoirs in the world. The height of the dam will be 245 feet and the depth of water stored at the dam will be 195 feet when full. The dam will be 165 feet wide at the bottom and 16 feet at the top. The project represents practically nothing to Gila County in taxable wealth, but it will be of great benefit to Arizona, and especially to the Salt River Valley.

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The Gila Valley Globe and Northern Railway Company is transacting double the business of former years. A year ago two mixed trains were sufficient to handle the traffic of this road, while to-day two passenger trains and two freight trains are operated daily. The management, under Col. Epes Randolph, is having a survey run north from Globe, through the Tonto reservoir site, into Pleasant Valley and the Mongollon Mountains, and it is hoped that the resources of northern Gila County will soon be more available.

Pleasant Valley and the Tonto Basin country, extending to what is known as Rim Rock, are parts of this county but slightly developed, owing to lack of railroad transportation, but thousands of cattle, horses, and goats are annually raised in this district. In the valleys subject to irrigation the crops are prolific and large crops of fruit are often without a market.

What is known as the "coal strip" lies near San Carlos, and was formerly a part of the White Mountain Indian Reservation, but now has been set aside by Congress, and is opened to the prospector. At the present time the Tri-Bullion Copper Company and Phelps, Dodge & Co. are the principal parties working in this district.

Something of importance to Gila County, and a matter on which action has been delayed, is the setting aside of the proposed Pinal Mountain forest reserve. These mountains were formerly thickly covered with stately pines and shrubbery in abundance. To-day they are denuded and their rocky ridges stand forth as a monument to the destructiveness of the woodman's ax. The grass that once grew luxuriantly grows no more, and the rain as it falls on the mountain runs off rapidly. Nature has been deprived of its power to hold this water and store it to feed the numerous springs that formerly gushed forth from these mountains. Goats have been very destructive here; they have eaten the young, tender shoots, and their feet soon wear a thousand small trails through the underbrush, making natural runways for the water as it falls and carrying it down to the canyons, doing but little toward the natural irrigation of these beautiful mountains.

I am under obligations to Mr. W. D. Fisk, recorder of Gila County, for the information presented in the report of Gila County's progress.

MARICOPA COUNTY.

Agriculture is the chief industry in this county, although there are some mines and activity in their development. This county has the largest population of any in the Territory, and the increase each year is considerable. The construction of the Tonto dam will attract large numbers of settlers, and thousands of acres of land which is not cultivated to-day, owing to the absence of an adequate water supply, will be made productive.

During the year the Phoenix and Eastern road was built from Phoenix to Kelvin, Pinal County, adding to the commercial importance of the Salt River Valley and its chief cities, Phoenix, Mesa, and Tempe.

The Salt River Valley is reached by both the Santa Fe and Southern Pacific systems. From the south comes the Maricopa and Phoenix and Salt River Valley Railway, making connections at Maricopa, 35 miles away, with the Sunset Route. From Tempe a branch of this road leads to Mesa, 18 miles from Phoenix. From the Santa Fe system Phoenix is reached by the Santa Fe, Prescott and Phoenix

Railway, 198 miles in length. Both railways into Phoenix are fully equipped for passenger travel, all trains including modern appointments and standard sleepers.

Stockraising is extensively engaged in, and thousands of head of cattle are fed every year in the valley. During times of drought range stock is driven to the valley for pasture until the rains replenish the ranges. It is estimated that there were fully 50,000 head of range cattle pastured in the Salt River Valley during the past winter when the ranges suffered from extreme drought.

The mining industry of Marciopa County has been relegated to one of the last of the industries of importance, although hidden in the mountain ranges within sight of Phoenix are mineral treasures destined to great consideration. It has been asserted by mining men that the importance of this industry in time will eclipse that of agriculture and cattle raising—now by far the most important occupations. Wickenburg, located just south of the Yavapai County boundary line, in Marciopa County, is the seat of recent mining activity, although the contributors to that camp for the most part are Yavapai County mines. There are regions, however, in Maricopa County tributary to Wickenburg which contributed early to the mineral wealth of this county. In the southeastern part of the county is the gold field district where mining operations are carried on to some extent.

The products of Salt River Valley are of a very wide range and great variety. Nearly everything in the way of grains, vegetables, and fruits grown in the temperate and semitropic zones flourish here. Wheat and barley are of an exceedingly fine quality. The principal forage plant for hay and pasture is alfalfa, or Chilean clover, a remarkable plant which grows perennially and yields very abundantly. Seven tons per acre per annum is not an unusual yield, the hay being cut from three to seven times each year. All kinds of vegetables grow with wonderful rapidity. Many of them, with proper care and irrigation, can be produced the year round. All kinds of berries flourish, the strawberry in particular. With proper attention to varieties and cultivation strawberries can be had daily for eight months of the year. All kinds of deciduous fruits do exceedingly well throughout the entire valley, but in the upper parts, where the soil is of light sandy nature, the adaptability is perfect. The soil along the river being heavier, is more suited to the cultivation of grain and forage. The raising of all kinds of citrus fruits is confined to a comparatively small portion of the valley.

MOHAVE COUNTY.

Mohave County, in the northwestern corner of the Territory, is one of the important mining counties of Arizona and the one that depends the most exclusively on the mining industry. On its west are California and Nevada, and on its north Nevada and Utah. The Colorado River bounds it on the west. It has 13,421 square miles, but a very small population. Very little of its arid valleys and plains are yet irrigated, but the county has thousands of acres that could be reclaimed. Three mountain ranges traverse the county from north to south, and their rocky ribs are seamed with ledges of gold, silver, copper, and lead. Near Mineral Park are many ledges of turquoise, which show evidences of having been systematically worked by a prehistoric race.

Stone hammers and rude tools have been found in all the openings of the mines. There are immense beds of gypsum along the Colorado River northwest of Kingman.

Mohave County's mines are estimated to have yielded over $40,000,000 in thirty years. Mining began in 1860, but did not flourish until the coming of the Santa Fe Pacific Railroad across the country. Before that communication with the outside world was by way of steamer down the Colorado River. Some very valuable discoveries were made in the White Hill district in 1892, since which time large amounts of eastern capital have been invested and development has been rapid. In one case an English company paid $1,750,000 for the White Hill group, and have since expended $500,000 in developing water and working the mine. At Chloride a 100-ton concentrating plant is being worked by a Scotch syndicate on the ore from the Elkhart mine, and a 40-ton stamp mill is working in the White Hills.

The Hualapai mining district contains an area of 15 miles in length by 3 miles in width, and is composed of five different mining camps—Chloride, Mineral Park, Todd Basin, Cerbat, and Stockton Hill.

A few miles south of Kingman a district rich in gold is being opened up. There has been little, if any, increase in the settlement of land. While no country can excel the valleys of Mohave County in fertility of soil, the scarcity of water for irrigation retards their settlement. The system of dams on the Colorado River, as proposed by Arthur P. Davis, hydrographer of the United States survey, would place under irrigation hundreds of thousands of acres of land excelled by none in the world. In Mohave County alone sufficient land could be irrigated to support a population of half a million people.

In addition to the great benefit to be derived from these dams for irrigation, the immense power developed could not only be used for power in mining operation, railroads, etc., but could be used also for the reduction and refining of ores.

There has been little change in the past year in the matter of stock-raising. The uncertainty of the rainfall discourages investment.

Mining is the great industry of Mohave County, and the past year has been one of progress in all mining districts.

NAVAJO COUNTY.

The population of this county has increased steadily and permanently in the past year. The increase is due to the settlement in the county of former residents of Tuba City, Coconino County, having sold their lands and holdings at that point to the Government for Indian school purposes. These people are a very desirable class of settlers and home-makers.

There are about 4,000 acres of land under cultivation in Navajo County, producing all kinds of grains, fruits, and vegetables found in a temperate climate, and the agricultural possibilities are limitless, with sufficient water for the purposes of irrigation.

With the increase of the farming population comes the added financial prosperity of the county. The assessment roll for the year shows about $1,500,000 of assessable property, being an increase of about $200,000 over last year; but owing to the long-continued drought, affecting particularly the stock interests, and indirectly other industries, the board of supervisors, sitting as a board of equalization, made

a reduction of 20 per cent on stock, cattle and horses, sheep, cultivated lands and improvements, town lots and improvements, and stocks of merchandise, leaving the total assessed valuation at $1,229,644.97.

The county is conducted on economical business principles as heretofore, with no outstanding warrants or other liabilities than shown as follows: Territorial funding bonds, at 5 per cent, dated January 15, 1903, redeemable after twenty years, maturing in fifty years, $38,000; court-house and jail building bonds, $15,000; total bonded indebtedness, $53,000. Total assets represented in public buildings, bridges, and other county property, $68,780; value of school property owned by county, December 31, 1903, $20,000; cash on hand, as per treasurer's report, June 30, 1904, $15.244.91; total value of county property and cash on hand, $104,024.91.

The abstract furnished the territorial board of equalization by the clerk of the county board shows the following live stock: Range horses, 1,359, valued, after deducting 20 per cent, $10,599; range cattle, 3,666; valued, after deducting 20 per cent, $35,200; sheep, 73,460, valued, after deducting 20 per cent, $117,536; all other stock, including work and saddle horses, stallions, mules, jacks, milch cows, bulls, goats, and swine, $30,945.50. These are held by individuals and are principally graded stock. Under favorable conditions of range and water, stock raising is the most important industry in the county.

The county superintendent of schools reports a prosperous condition of all the schools in the county, each district having a surplus of funds on hand for the ensuing school year. This can be accounted for by the fact that the county board of supervisors make a more liberal apportionment of the tax levy for school purposes than is made by any other county, being 90 cents on each $100 of taxable property and 5 per cent of a reserve fund. The total apportionment for the last school year was over $14,000 for 12 school districts, the board realizing that the liberal distribution of money for school purposes is well invested, and mindful of the importance of giving the children the advantages of an education.

With the agricultural and stock industries steadily increasing and with possibilities of water storage, Navajo County will take its place among the most prosperous counties of the Territory.

Holbrook, the county seat, is the most important shipping point between Albuquerque, N. Mex., and Needles, Cal., being the supply point for a radius of country of over 200 miles in extent. Some idea may be gained of the amount of freight shipments made from the figures received through the courtesy of the railroad agent, Mr. J. H. Atwood, and the quartermaster's agent, Mr. Thorswald Larson, presented as follows: Amount of wool shipped up to June 30, 1904, 760,000 pounds; amount of freight received, 1,700,194 pounds; amount of Government freight received during same period, 2,120,000 pounds. A large amount of live stock was shipped to eastern markets, the figures not obtainable.

Winslow, the largest town in the county, 33 miles west of the county seat, is an important railroad center, being the end of the passenger and freight divisions of the Atchison, Topeka, and Santa Fe Railway. The company at this point has large roundhouses, machine and repair shops, depot buildings and eating houses, and also a hospital for sick and injured employees. The monthly disbursements of the company amount to about $50,000. The town has recently completed a system

of water service, with fire hydrants and an organized fire department. It also has telephone, ice, and electric plants.

The prospects for oil development near the town of Winslow are very favorable. At present the work of boring is in progress. About 32,000 acres have been located and recorded. There are also deposits of mica and gypsum in the vicinity of the town which will eventually have a large marketable value.

The next town of size and importance is Snowflake, 30 miles south of the county seat, with a population of about 600. This town is situated in a fertile well-watered valley. The residences and business houses are built of brick, with shade trees lining the wide and regularly laid out streets.

St. Joseph, Woodruff, Taylor, Show Low, Pinetop, Pinedale, and Heber are thriving towns, each contributing its share to the general well being of the county. In none of these communities are lacking the elements which constitute intelligent citizenship, a respect for the law and a desire for intellectual advancement. The record of the district court, which is held once a year by the Hon. R. E. Sloan, shows that not one of the few criminals brought to trial during the year were citizens of the county. The last term of court lasted three days, the most of that time being occupied by civil cases.

Mr. Alex. F. McAllister, recorder and clerk of the board of supervisors of Navajo County, furnished me with the information contained in the above statement.

PIMA COUNTY.

Mining, cattle raising, and commercial enterprises occupy the attention of the people of Pima County. Rich copper, gold, and lead mines are operated profitably, and immense bodies of ore yet await the industrious prospector.

The assessed valuation of Pima County's taxable property for the calendar year 1903 amounts to $3,900,000, presenting an increase over 1902 of nearly $200,000, the increase being due to the many permanent improvements made throughout the county.

There are 260 patented mines in the county, having an assessed valuation of $70,000. One group of these mines changed hands during the month of May, 1903, for a cash consideration of $500,000.

The bonded indebtedness of Pima County is as follows:

Territorial 5 per cent bonds	$210,240
County 7 per cent bonds	50,000
County 4 per cent refunding bonds	47,000
Total	307,240

The resources of Pima County are as follows:

7 per cent bonds due from Santa Cruz County	$8,513.33
5 per cent bonds due from Santa Cruz County	44,893.67
Cash in treasury	29,000.00
Court-house and county property	50,000.00
Total	132,457.00

During the past year numerous final certificates of Government land were issued by the United States land office at Tucson for land in Pima County occupied by settlers.

There are thousands of acres of land in this county susceptible of cultivation. The benefits of irrigation such as is proposed by the

Hansbrough-Newlands law will soon be realized, and then thousands of acres of land, comprising rich alluvial soil will be brought under cultivation, and will open up agricultural possibilities that will surpass the most sanguine expectations.

Fruits, such as apples, peaches, pears, melons, and grapes of the finest flavor are produced, surpassing the famous fruits of California. Chinese gardeners raise and market all kinds of table vegetables.

The development of water in Pima County has been given considerable attention during the past few years. The city of Tucson is supplied with a superior quality of water pumped from wells dug 40 feet deep. The city operates four wells side by side, having a daily capacity of over 5,000,000 gallons. Many of the residents have erected windmills and have secured an abundance of water at depths ranging from 20 to 80 feet.

There are 5,000 horses in the county. The number of cattle is estimated at 40,000. Sheep and hogs are not raised to any great extent although the market value of these animals is inviting. During the past year there was a number of cattle shipped by rail from Tucson to northern and eastern points. The quality and breed of range cattle is rapidly improving owing to the importation of thoroughbred Hereford bulls that range with the cattle.

The numerous locations of mining claims during the year show unusual activity in the mining districts of the county. A great many mines are working constantly, labor and fuel being plentiful and cheap. Development of copper, gold, and other precious metals is being prosecuted vigorously.

The transfer of the Silver Bell properties for a consideration in excess of half a million dollars, and the organization of a company to operate the Twin Buttes mines, indicates a healthy condition in the mining industry of Pima County.

The Greaterville placers are also being profitably worked by California capital, about 2,000 acres having been patented recently. Many smaller mines are being successfully operated and the outlook is encouraging for mine owners.

The county roads are a great delight to the owners of automobiles and horses, being hard and smooth. Substantial bridges span the river beds and water courses.

Pima County is proud of the many school buildings that have been erected by the progressive citizens of each school district, and which are presided over by intelligent and enthusiastic teachers devoted to the welfare of the pupils. More than 4,000 pupils attend the public schools of this county, and 500 children attend the convent and schools conducted by the Catholic sisters at Tucson. The University of Arizona is located at Tucson, and is a great factor in developing the best citizenship. Tucson has a splendid public school system, with a large corps of trained teachers. The Catholic sisters conduct a school for girls and a free school for boys.

A new sanitarium conducted by the Sisters of St. Mary, together with a modern operating room, are worthy improvements.

The religious denominations are represented by Presbyterian, Methodist, Congregational, Episcopalian, Catholic, and Baptist. All of these denominations except the Presbyterian own and occupy comfortable church edifices, and are doing good work in the upbuilding of the community. The Roman Catholic cathedral is the largest in the Territory.

Tucson is the headquarters of the Southern Pacific Railroad Company, of the district from Yuma to El Paso, a distance of nearly 600 miles, together with all branch roads connected therewith. The machine shops and supply stores are also located there, and the company disburses over $150,000 each month at Tucson.

PINAL COUNTY.

In Pinal County mining, stock raising, and agriculture combine in advancing the material well-being of the people. Agriculture has received a setback, owing to the drought and the consequent shortage of water for irrigation; but this condition will be obviated on the completion of the San Carlos Dam, a worthy project, which will no doubt appeal to the honorable Secretary of the Interior as a medium for enlarging the benefits to be derived from the application of the reclamation law in this Territory.

Mining has been carried on in Pinal County for many years, and there are several promising properties, among them being the Troy, Ray, Copper Buttes, Bonanza, Copper Hill, Golden Eagle, Standard, Gila-Pinal, and many others. Pinal County is regarded as one of the most promising mining fields in the Territory.

Shipments of ore have been made during the year, but there has been little bullion smelted by local works. Extensive exploitation is going on throughout the county, the Troy being credited with the production of quantities of good ore. The Copper Buttes Company is working its mines in the Buttes on the Gila River and has a promising prospect. The Lake Superior Company, with mines in the northern part of the county, has made several carload shipments of ore. The Troy-Manhattan Company's mines in the northeastern part of the county have been worked constantly during the year, ore having been produced in quantities.

There are 41 patented mines on the assessment roll of Pinal County, the assessed valuation thereof being $41,000. The construction of the Phoenix and Eastern Railway to Kelvin has brought about greater activity in mining, lessening the cost of operations to some extent. With railway facilities the future of Pinal County is very bright, and the people confidently look for a new era of progress.

Owing to the severe drought the cattle industry has suffered during the year, and in consequence the total valuation of all property in the county is considerably less than the year previous.

On June 30 the floating indebtedness of Pinal County was $9,540.56. The money on hand was $11,234.85. The county has a funded debt of $136,138.08, and court-house and jail bonds outstanding amounting to $6,000.

There has been some increase in the population, principally in the mining districts, the county having approximately 8,000 people.

There are several ditches taken from the Gila River, the largest being the Florence, 47 miles in length, with a reservoir of 1,600 acres. The canal is taken out of the Gila River about 3 miles west of the Buttes, and runs in a southwesterly direction 47 miles through the Casa Grande Valley. The reservoir is situated about 13 miles southwest of Florence on the line of the canal. This ditch carries 3,000 miner's inches of water and was built at a cost of $500,000. In the vicinity of Sacaton on the reservation there are 10 ditches of small

dimensions taking water from the Gila River which are owned and controlled by the Indians. In the San Pedro Valley irrigation is practiced on a small scale by ranchers, five or six ditches being in operation. The Arivaipa Creek, a tributary of the San Pedro River, traverses a rich agricultural valley, and there are many small ranches along the creek.

Pinal County is rich in undeveloped resources. The construction of the San Carlos Dam will be the means of bringing thousands of acres of fertile lands under cultivation, and the county's taxable wealth will be wonderfully increased. The railway traversing the Gila and San Pedro valleys will open up a rich country to settlement.

SANTA CRUZ COUNTY.

Mining and stock raising are the chief pursuits in this county. Agriculture is carried on to some extent in the Santa Cruz Valley and along the Sonoita River. The soil is very fertile, and when there is sufficient water easily produces two crops a year. Irrigation is carried on to some extent, but the supply of water is insufficient. It is estimated that with sufficient water fully 30,000 acres of land could be brought under cultivation, thus increasing the assessable value of property within the county by more than a million dollars. This could easily be brought about by the construction of a storage dam on the Santa Cruz River.. It is said that one of the best reservoir sites in Arizona is situated on the Santa Cruz River, in this county, about 4 miles from the international boundary line. The supervisors of Santa Cruz County ordered a preliminary survey, which shows that a dam can be constructed there 900 feet long and with an average height of 40 feet. Such a dam will impound flood waters of the summer and early fall forming a reservoir covering 3 square miles and with an average depth of 30 feet. Nearly all the land submerged is unsurveyed, unoffered Government land, there being but few irrigating rights involved. The estimated cost of such a dam, according to the surveyor's report, will be from $80,000 to $100,000, and will be of almost incalculable value to Santa Cruz and Pima counties.

Santa Cruz County is notable for its large cattle ranches, and is regarded as one of the most profitable counties for stock raising.

The mining development has been substantial and unusually active during the year. This is especially true of the Patagonia and Oro Blanco districts. There are many rich mining districts in the county, the principal ones being the Patagonia, Harshaw, Tyndall, and Oro Blanco. The principal mines in Santa Cruz County are the World's Fair, the Pride of the West, the Hardshell, the Trench and the Mowry, in the Patagonia and Harshaw districts, and the Tres Amigos, the Monarch, the Ragnarac, the Sorrel Top group, and the McDonald properties in the Oro Blanco district.

The undeveloped resources of Santa Cruz County are extensive. It is a recognized fact that the mineral resources of this county have never been developed, there being at the present time but a small number of producing mines. The county is rich in mineral, and wherever development has been prosecuted to any great depth upon ore bodies excellent results have been obtained.

The population is rapidly increasing, and a conservative estimate at present places the number of people in the county at no less than

7,000. With the continued opening up and development of the rich mineral resources it is confidently expected that the population will show a still greater proportionate increase during the next year. Nogales, the county seat and principal town in the county, is a growing, thriving little city of about 2,500 people. Situated, as it is, on the international boundary line between the United States and Mexico, at the gateway of the rich and rapidly developing State of Sonora, Nogales is destined at no far distant day to be one of the most important cities of southern Arizona and of the Southwest. Its citizens are of the sturdy, substantial class, the greater number of whom own their own homes. A great number of substantial business structures and neat brick and stone cottages have been built during the past year. The new Santa Cruz County court-house, costing $35,000, is one of the most substantial, commodious, and up-to-date structures of its kind in the West.

YAVAPAI COUNTY.

This county has always progressed owing to the substantial character of its developed resources. The mines contribute the most to the material advancement of the county, although stock raising and agriculture are pursued successfully. Some of the richest mines in the Territory are located in Yavapai County. Gold, copper, and silver are produced. At Mayer there are onyx deposits covering an area of 250 acres. They are worked by the Denver Onyx and Marble Company, the product being shipped to all parts of the world.

Prescott, the county seat, is a thriving city, delightfully located in a basin of the Sierra Prieta Mountains. The Bank of Arizona, located there, enjoys the distinction of having the largest deposits of any bank in Arizona, showing the substantial character of Prescott's financial institutions.

Prescott is the metropolis of northern and central Arizona. The summers are ideal, the city being at an elevation of 5,432 feet above sea level, and annually hundreds of tourists come to camp out in the open and avail themselves of the pure and dry air. The population of this city may conservatively be placed at 6,000; it also enjoys the distinction of being one of the most progressive cities in Arizona. Its commercial houses are architectural beauties, solid, and modern, while in comfort and design the residences are pronounced by the visitor as an agreeable surprise to what was generally anticipated as prevailing on the border land of the Union.

In a commercial sense Prescott is the gateway to a vast domain of country, and from it and to it all roads go and come, whether it be the railroad, wagon road, or the burro trail. Every line of business is represented.

The public school interests are as sacredly guarded here as in New England, and that this spirit prevails it may incidentally be mentioned that a brick building that cost over $60,000 to build is utilized for that purpose. The Sisters of St. Joseph also maintain a seminary, and they, too, find favor with generous patronage.

Within the boundaries of the county are located the valleys of the Verde, Skull, Kirkland, Chino, and others. In addition to these are the bottom lands that lie at the foot of mountain ranges and along the many water courses. All of these sections produce abundantly in

grain, fruit, and vegetables, and in fertility can not be surpassed. The most prosperous and productive area in the county is that of the Verde, covering a distance in length of 29 miles by a width of 4 miles. This particular locality is well watered and production is heavy. Through its agricultural resources it sustains a population of at least 1,500 people. With water storage reservoirs located at desirable points there is no reason why agriculture can not be made as prominent as mining.

YUMA COUNTY.

Yuma county is regarded as one of the best gold-producing sections of the Territory. The precious metals are found in all parts of the county and numerous rich mines are constant producers there.

The future progress of agriculture in this county is now assured, with the Government irrigation works under way. Preliminary surveys have been made and the projects outlined by the Government engineers will be constructed on condition that the requirements of the Government are carried out by the landowners in accordance with the provisions of the reclamation law. This is now being done and active work will no doubt be started by the Government during the coming year.

The board of trade at Yuma states that there are 350,000 acres of arable land lying under the proposed dam at Cocopah Point. Of this 280,000 acres are level mesa lands, above the frost line—the finest of land for oranges, lemons, and early fruits; 70,000 acres are rich alluvial valley lands, lying along the Colorado and Gila rivers. Of these 60,000 acres lie under the outflow of canals already in operation. Much of this 350,000 acres is Government land open to settlement. Nearly all of the valley land has been already filed upon by settlers, since it was first thrown open to settlement in 1901, but many claims and even patented land can be purchased at figures ranging from $5 to $100 per acre, according to location and improvement. Much money has been made by those who have purchased lands in the past two years. There are many cases where claims purchased three years ago for $400 are now worth $6,000, although no expensive improvements have been made.

The climate and soil of Yuma County seem to be perfectly suited to alfalfa. It grows so rapidly that it is mown always seven times, often eight times, a year, producing from 1 to 2 tons per cutting. The average yield is 10 tons per acre per year, and the best fields often produce 12 tons. Besides yielding this quantity of hay, the fields furnish good pasture during two or three of the winter months. The season is so long that the first crop is cut early in April and it is not unusual to see ranchers haying at Christmas time.

All citrus fruits do well and the early season again gives Yuma the advantage. The orange crop is usually about exhausted when the main California crop reaches the market.

Many of the ranchers near Yuma manage their rotation of crops in the following way: In the fall, as early as possible, the land is sown to wheat or barley. This soon attains a rank growth and cattle are turned upon the grain to pasture it down. This continues until February, when the grain is allowed to grow up. It is ready to harvest in late May or early June, producing 2,400 to 3,000 pounds of grain

per acre. The land can then be plowed and put into Indian corn, sorghum, or Kaffir corn, with immense yields and ripening in October.

Some ranches have been very successful with the following rotation: In the winter alfalfa sod is plowed shallow, or cut up with a disk harrow, and wheat or barley is harrowed in. The fertile soil, enriched by previous pasturing, and the alfalfa sod produces from 2,700 to 3,000 pounds of grain per acre. Meanwhile every alfalfa crown has sent out shoots which come up in a mat all through the grain. This makes the straw, when cut, excellent feed for cattle. The grain is cut in early June, and the alfalfa then takes the ground and in a month is ready to cut for hay. Thus one crop of grain, one crop of straw, half alfalfa, and four cuttings of alfalfa, averaging 1 to 1½ tons to the acre, are secured in one season.

MINING.

The actual production of the precious metals in Arizona for any one year is only approximately known. There is no Territorial agency which provides accurate statistics, and without some definite means of securing reports from all operating mines it is impossible to more than estimate the output.

In my report for the year 1903 I endeavored to give an accurate idea of the progress of mining by submitting statements from mine owners throughout the Territory, but I found that scarcely one-fourth of the companies and individuals to whom I addressed requests for such reports gave the matter attention. Through the assistance of the railway companies I expected to present in that report figures showing the shipments of bullion and ores, and in this way getting at the actual production of mines in the Territory, but when I had received and tabulated these reports objection was raised by one or two railway companies to the use of their statements. Therefore, with no agency through which reports from mine operators can be secured, I can merely review the progress of mining in Arizona during the fiscal year ended June 30, 1904, giving such figures as I am able to find which will show the production.

Copper mined in this Territory during the year 1903 yielded to the markets of the world over 150,000,000 pounds. These figures are based on reports from the leading mines. During the past fiscal year the production from all sources in the Territory will reach 230,000,000 pounds. I base this estimate upon information from the leading operating mines, such as the Copper Queen, the Detroit Copper Company, the United Globe and Old Dominion, the Arizona Copper Company, the United Verde, and the Calumet and Arizona.

At the works of the Phelps-Dodge Company, in Arizona, there was manufactured during the month of June 16,000,000 pounds of copper. Taking this as an average monthly production throughout the year, this one company, with works at Bisbee, Douglas, Morenci, Clifton, and Globe, manufactured 192,000,000 pounds. Add to this the production at Jerome by the United Verde Works, approximately 30,000,000 pounds, and the production of individual works in Mohave, Yavapai, Pima, Pinal, Cochise, Yuma, and Graham counties, the total will reach the estimate I have given. In further support of this estimate, I would call attention to the production of the Shannon Copper Company's works in Graham County, one of the new mines of this Territory. In

June this company produced 477 tons of copper and in May 463 tons. For the first six months of 1904, or rather the last six months of the fiscal year ended June 30, this company produced 6,000,000 pounds of copper. At this rate of production the Shannon Works, producing 12,000,000 pounds a year, the United Verde, 30,000,000, and the Phelps-Dodge interests, 192,000,000, there can be no doubt but that the total production in the Territory was fully equal to the estimate I have presented.

A great many producing mines are not taken into account in arriving at the total production, only in a general way, and I give the figures in round numbers for the reason that no definite statistics can be secured covering the entire Territory, as I have heretofore stated.

Through the wealth of its mines Arizona has become a great manufacturing region. It occupies third place in the production of copper, with Montana and Michigan leading. The progress made is rapid and substantial. Adverse conditions had to be met and difficult problems solved. During many of the years of copper mining there was little encouragement, owing to the low prices commanded, or because of unfavorable local conditions; but, on the whole, this industry has risen rapidly, depth adding to its strength and entrenching it firmly at the very source of wealth.

The production of copper began in Arizona in 1873 at the Longfellow mine in Clifton, Graham County. Previous to this time there was some copper smelted by means of crude adobe works whose capacity ranged from 1 to 4 tons daily. The output of copper up to the year 1880 is unknown. No copper region in the world has shown such marked gains in production during the past decade. The great activity throughout the copper-mining districts of the Territory is fast bringing new mines into prominence and adding new sources of production.

Copper mining is expanding beyond the expectations of all who first dreamed of wealth from its source. Arizona in 1903 produced 60 per cent as much copper as Montana, the greatest copper region in the United States. It produced 73 per cent as much copper as Michigan with its great Calumet and Hecla mines. Each year the percentage of increase lessens the distance to first place, the ultimate goal of Arizona's progress in this industry.

The Old Dominion copper mine at Globe is credited with having produced during its span of intermittent activity 120,000,000 pounds of copper. With this yield to its credit, the mine is still considered in the first stages of its development. This is mentioned to show the substantiability of copper mines that have been developed. Not all mines are like the Old Dominion, but I think I am safe in saying that every copper mine in this Territory that has reached the same stage of development can be classed with it as a wealth producer.

It has been stated that Arizona contains one-third of the copper mines of the world. This is no doubt true when we take into account every prospect and every virgin lode upon which monuments rest vesting ownership; yet it is an unfair statement, for the reason that it conveys a wrong impression. There are thousands of mines in Arizona that are nonproductive, it is true, if they are to be called mines. The United Verde and many other mines were also nonproductive with the same amount of development. Timidity never accomplished anything

in mining. An industry that returns such great profits must have a corresponding element of chance, and the value of a mine is disclosed only upon extensive exploitation.

During the past year the Copper Queen Company transferred its smelting operations from Bisbee to Douglas. Bisbee to-day is essentially a mining camp, and Douglas has become a manufacturing center of great importance. At Douglas the ores from the Copper Queen mines at Bisbee and the ores from the Nacosari properties in Sonora will be treated. Aside from this the company has opened a customs department, and ores from the thousands of mines in Arizona and Sonora will be afforded a ready market. Heretofore operators of small mines have shipped their products to El Paso smelters at great expense in freight rates. The opening of the customs works at Douglas will encourage mining throughout the southwest and increase the productiveness of the Territory.

The Old Dominion Mining Company at Globe now embraces the United Globe mines at that place. The aggregate output of this company during the month of May was close to 1,600,000 pounds, returning to the company about $60,000 net. This was the best record in the history of the company, and is mentioned merely to show the progress that is being made. The company's smelter is now treating about 60 tons of ore per day from the United Globe property alone, the average yield of which is 15 per cent copper. The company is holding back the output of the Old Dominion mine in order to place the property in better condition and open large ore bodies to be mined in the future.

The great copper district surrounding Bisbee has attracted over $4,000,000 of capital from the Lake Superior district. The confidence of investors who understand copper mining is the strongest proof of the value of a district. Some of the richest mines in the Bisbee district have been developed by capital from the older copper-mining regions of the United States.

The growth of copper mining during the past year has been marvelous. The Calumet and Arizona mine in Cochise County is a good example of the rapidity of progress in copper mining. The first furnace of this company was blown in November 1, 1902, and during the following eighteen months the net earnings were at the rate of $2,000,000 a year. This is one of the mines that has come into prominence within a very short time.

Among the new producers of copper might be mentioned the Shannon, in Graham County; the Troy, in Pinal County; the Black Diamond, in Cochise County, and numerous others. There are many small shippers throughout the Territory, the ores going to New Mexico, Colorado, and Texas smelters for reduction. The quantity of bullion produced from these shipments can not be ascertained.

In the table presented herewith, showing the production of copper from 1880 to 1904, the smaller shippers and smelters are scarcely considered during the later years. No doubt the total output is far greater than these figures show, owing to the uncertain manner in which the statistics are compiled. At any rate, there has been produced in this Territory during the past twenty-five years fully $158,000,000 worth of copper, placing the average price of that mineral at 10 cents a pound, which is exceedingly low.

The statement following shows the production of copper in Arizona by years from 1880 to 1904:

The production of copper in Arizona.

Year.	Quantity.	Year.	Quantity.
	Pounds.		*Pounds.*
1880[a]	2,000,000	1894[b]	44,531,108
1881[a]	5,000,000	1895[b]	48,329,403
1882[a]	15,000,000	1896[b]	73,745,321
1883[b]	23,874,963	1897[b]	81,019,922
1884[b]	26,734,345	1898[b]	100,000,000
1885[b]	22,706,366	1899[c]	133,054,860
1886[b]	15,657,035	1900[c]	118,317,764
1887[b]	17,720,462	1901[c]	130,778,611
1888[b]	31,797,300	1902[c]	119,944,944
1889[b]	31,586,185	1903	150,000,000
1890[b]	34,796,689	1904[a]	230,000,000
1891[b]	39,873,279		
1892[b]	38,436,079	Total production since 1880 (8 years' product unknown) ..	1,578,697,560
1893[b]	43,902,824		

[a] The figures for 1880, 1881, and 1882 are from Patrick Hamilton's "Resources of Arizona."
[b] From 1883 to 1898 are from the tables given in Mineral Industry, vol. vi, Science Publishing Company, New York.
[c] From 1899 to 1902 from the tables given in Stevens' Copper Hand Book, 1903 and 1904 being estimated upon the production of the larger mines of the Territory.

Although the figures are not at hand, I have no hesitancy in stating that Arizona is now entitled to second place in the production of copper in the United States. The coming year gives promise of augmenting the production many millions of pounds. The Imperial Copper Company may be among the new producers, the Twin Buttes promises to add its quota to the supply, and the Troy, in Pinal County, will no doubt be active as a producer. In Cochise County many mines are being equipped for active production, and the older works will be pressed to their utmost capacity. In a very short time Arizona will become the leading copper region in the United States. Montana depends on the production of its old mines, very few new ones coming into existence each year, while in Arizona there are new works erected each year in the copper districts, adding to the supply of copper bullion.

If Cananea, virtually dependent upon Arizona in the development of its resources, could properly be included, Arizona would rank first in copper production. This mine is owned by an Arizona man, Col. W. C. Greene, and this Territory has been called on in many ways in the operation of the property. Cananea is located but a short distance below the line in Mexico.

A number of smelters have been erected in different parts of the Territory, and thousands of companies are carrying on operations which are at present in the prospective stage. The shipment of copper ores has increased wonderfully during the past year.

The Imperial Copper Company, one of the new operators in southern Arizona, is carrying on extensive exploitation, having connected their property by rail with the Southern Pacific. The shipment of ores will begin September 1, when the railway is completed. Two double compartment shafts have been sunk about 2,000 feet apart and to depths of 350 and 400 feet. Drifting has been prosecuted from these shafts, 150 men being employed in the development work.

GOLD AND SILVER MINING.

It was gold that first attracted Europeans to the southwest, and gold led the Jesuit fathers to this rich land during the seventeenth century. Surrounding the old missions workings were discovered that left no doubt as to who were the pioneer miners of Primeria Alta, the name by which Arizona was then known. The first rush to the new land began in 1736, when silver and gold was found in large quantities near what is now the border line of Sonora and Arizona. Prominence was given to the discovery in Spain by the confiscation of a nugget which the King claimed as a curiosity.

The European invasion of Arizona began in 1853, ten years before this Territory was separated from New Mexico, and became a separate subdivision. The first explorers scratched the surface, picking up the nuggets. It was these nuggets that spread the fame of this region as a gold country. Rich Hill, in Yavapai County, was one of the first discoveries. It was found by Pauline Weaver's party in 1863, yielding untold wealth to the hardy pioneers who braved the dangers of the frontier in search of it. What the production of gold has been in all the years passed no one knows.

Silver was discovered about the same time, each year adding to the riches of the new country as the pioneers ventured farther and farther into the wilderness. The discovery of the Tombstone mines in later years increased the interest in silver mining. From 1879 to 1882 Arizona jumped from seventh in the list of gold production to third place. The production of gold in 1879 was $1,942,403; in 1882 it was $9,298,267.

The demonetization of silver started the prospectors in search of new metals, and copper gradually became king. Gold and silver have yielded fortunes, but copper to-day stands at the head of the list in wealth productiveness.

There are many substantial gold-producing mines in this Territory. Yavapai County probably leads in gold, with Yuma second. Among the leading mines which are now active producers may be named the Octave, McCabe, Henrietta, Congress, O'Brien, Model, Braganza, Alto, Chaparrel, Bannie, Burlington, Leland, Bunker Hill, Poland, Old Mesa, Cypress, Dividend, Little Jessie, Eureka, Evening Star, Jim Crow, Kinney group, Oriental, Lottie, Gold Note, Stark, Petaluma, Coronado, Keystone, Kennedy group, Octupus group, White, Pfau, Cornucopia, Buffalo, Gold Lode, Lion, Gold Link, Hillside, Thorne, Alma, Cash, Gillespie, Senator, Eagle Tail, Cadillac, Lincoln, Mohawk, Old Reliable, Tiger, Oro, Rapid Transit, Corono, Bodie M., Hudson, Pine Mountain, Hise Exploration Company, Planet-Saturn, Braganza, Buckhorn, Catoctin, Butternut, Gold and Copper consolidated mines, Golden Link, Golden Rule, Lelan, May group, Monica, Monte Cristo and Hidden Treasure, Palo Alto, Tiger, Victor, Crown Point, Treadwell mines, and many others.

The Octave has produced more than $2,000,000 during the past four years of active operation. It is regarded as one of the permanent gold producers of the Territory. Eight miles of development work have been completed, the shafts attaining depths of 500, 1,450, and 1,600 feet. This camp is located about 12 miles from Congress, and has a population of about 500. In the same vicinity are numerous gold mines of great promise.

Yuma County contains a number of rich gold mines, among them the Fortuna, King of Arizona, and Harqua Hala. These mines have been constant producers for many years. At Quartzite there are 10 companies operating mines. The Rich and Darling are among the leaders in active operation. A 160-ton stamp mill has been contracted for by O. A. Pease, who is carrying on extensive operations. Many other properties are being equipped in Yuma County. At Empire Flat, Castle Domè, Gila City, Harrisburg, and at many other points, large operations are progressing satisfactorily. It is impossible to give in detail the mines now in operation, as reports are hard to secure. Yuma County has progressed during the year in gold mining, and is maintaining its place among the leading gold counties in Arizona.

The Oro Grande is one of the leading gold mines in Maricopa County. Although a new camp, it has progressed rapidly, and the development has been active and successful. The Relief mine near Phœnix has received a great deal of attention and is well developed. The Vulture mine is one of the oldest gold mines in Arizona, having produced millions of dollars during the years of active operation. Among the other mines in operation are the White, Turkey Creek, Standard Dollar, Socorro, Pikes Peak, Mineral Hill, Lime Creek, Leviathan, Grijalva, Goldfield, Golden Rule, Gold Coin, Eddy, and Ben Hur.

In the White Tank, Castle Creek, Black Rock, and other mining districts, there has been the usual activity during the year, a large number of mines having shipped ores to smelters.

Pinal County has some gold mines of great value, the Mammoth ranking among the first in the Territory. Although copper predominates as a source of wealth in Gila County, yet there are numerous gold mines of value there. Pima contains a number of gold mines of promise, and in Graham and Santa Cruz there are many mines from which shipments are made during the year. In Cochise County the Commonwealth is famous as a producer of gold and silver, and operations are carried on at many other points in that rich county. Mohave County has some of the best gold mines to be found in the Territory. Operations are conducted throughout the year with success. Gold is also found in Coconino County.

The production of gold in Arizona was, approximately, $6,850,000 during the past fiscal year. La Fortuna, one of the chief gold mines, did not produce much during the year, owing to improvements being made in the mine, and the Mammoth, one of the largest gold producers in the southwest, was idle owing to litigation. The Commonwealth, at Pearce, also suffered some from accident to its workings, shortening its production of gold and silver somewhat.

The King of Arizona produced about $350,000, this being one of the younger mines of the Territory, although fast becoming a substantial one. It has been brought into the list of producers under the most adverse conditions, being located in the heart of the desert, without water and fuel. The gold and silver bullion produced and shipped to the mints by express could not be ascertained through Wells, Fargo & Co.'s express agencies, a source heretofore depended on for this information, hence it is impossible to more than approximate the output. However, even with the figures submitted by the express company, there would not be included the shipments of gold and silver

bearing ores to the smelters nor the production of these metals from copper ores where they appeared as a by-product.

The silver and lead produced was in the neighborhood of $2,000,000, which, with the gold production of $6,850,000, gives the total from the yield of gold, silver, and lead, $8,850,000. Giving an average value to copper of 13 cents per pound and placing the total production in the Territory at 230,000,000 pounds, as heretofore given, the value of copper was $29,900,000. The total value of copper, gold, silver, and lead was $38,750,000.

GEOLOGY OF ARIZONA.

In connection with mining development in the Territory during the year, I wish to call attention to the report of geological conditions as presented by the Territorial geologist:

The Territory of Arizona, with an area of 113,000 square miles, is a most inviting and interesting field for a geologist. Stretching from Mexico on the south to Utah on the north, from New Mexico on the east to California on the west, and lying between the parallels of 31.30 and 37 degrees, and the meridians of 109 and 115 degrees, it has a most diversified surface, climate, fauna and flora, and an extraordinary variety and wealth of mineral productions. The geologic conditions are equally varied. Every period of the world's history since the dawn of life is here represented as an open book, so that "he who runs may read." The pages of the rocky record are abundantly illustrated by the "medals of creation," and these are often changed from calcareous shells to enduring crystal, as if designed to more fully preserve and elucidate the record and invite the study of the evolution of organisms.

The Territory not only affords rich and undescribed material for the paleontologist, but for the zoologist, botanist, climatologist, and for the ethnologist and archæologist.

The history of humanity may here find a most interesting field of study in tracing and illuminating the course of exploration since the early Spanish prospectors and adventurers followed down the River of the Holy Cross (the Santa Cruz) and began the development of the silver-bearing lodes of Tumacacori and the Salero, before the settlements on Massachusetts Bay were firmly established.

The Territory, topographically, presents two great divisions—a plateau region on the north, made up of approximately horizontal strata, and the mountainous region on the south, consisting of uplifted strata plicated and folded with intrusive rocks and mineral veins. These mountain ranges are numerous and have a general northwest and southeast parallelism, with intermediate broad valleys formed by the intersection and blending of wide and gradual slopes, generally consisting of the wash and débris from the mountain ridges. These slopes, often 20 and 30 miles in breadth, presenting a very regular and even sky outline of only a few degrees of inclination, are a remarkable scenic feature of the mountain division, picturesquely comparable with the Great Plains or the horizontal mesas of the northern division.

Two great rivers, the Colorado and the Gila, with their tributaries, drain the greater part of the Territory. The Colorado is comparable with the Nile of Egypt. Like the Nile, it has its period of overflow and deposition of fertilizing alluvions. It flows through a semidesert region which blossoms as the rose wherever touched by its waters.

A large portion of the Territory is practically unexplored, and there are considerable areas of which nothing is known, not even the topography. In any attempted sketch it is thus impossible to do more than to touch upon some of the more salient features of the geology which have been more or less observed and studied.

The Territory has within its borders the most stupendous and magnificent canyon of erosion in the known world. In the days of the early explorers, Simpson in 1851, Whipple in 1853, and Beale in 1857, and for many years after, it was comparatively inaccessible and its secrets were hidden from the world; but since the daring and successful descent of the river by Major Powell, the Great Canyon of Arizona has become the Mecca of geologists and a new and rich revelation of the history of the globe.

This canyon was formed under peculiar conditions of erosion. A large water supply derived from melting snow and rainfall on distant ranges of mountains here found its way across a broad plateau country of horizontal strata in a comparatively rainless region, or at least where the precipitation was not sufficient to form tributary

streams by which the banks of the main stream could be broken down. Lateral canyons are rare.

Throughout southern Arizona there has been enormous erosion of the mountain ridges with corresponding great filling in of the valleys; and in these valleys, as, for example, in the San Pedro, wherever flowing water has existed there has been great transportation of material onward toward the Gulf. It is evident that in a comparatively recent period the rainfall was much greater than now, and that the streams ran with larger volume and power. There appears to have been a gradual desiccation which, however, is not confined to Arizona, but is world-wide and cosmic.

The existence of heavy beds of coarse conglomerate in numerous localities near or at the base of the Paleozoic strata show that in those remote periods there were shore lines and island-like ridges rising above the primeval ocean. These were the beginnings of Arizona land, which is thus shown to be ancient and insular in origin.

Pre-Cambrian.—Archean pre-Cambrian formations are found throughout Arizona, but are specially prominent in the mountain region from the Yuma ranges, bordering the Gulf of California to and including the Bradshaw Mountains. These last are upon the main axis of uplift, trending diagonally and centrally across Arizona from the great bend of the Colorado River, in Mohave County, toward the southeastern corner of the Territory. Besides the compact massive granites, there are large areas of gneiss, mica slates, and of clay slates, probably the equivalents of the formations known as Laurentian and Huronian, and also as Algonkian.

Rocks are extensively developed in the Graham Mountains and in the Catalina Mountains (formerly known as the Caterina Mountains), north of Tucson.

The rocks on the south side of the Catalinas are gneissic, in tabular form, and in great thickness.

On the northeastern side there is an extensive development of finely lamellar even-grained mica schist, showing very sharp plications so as to give a zigzag outcrop. These slates I have referred to the Huronian under the provisional titles of the Arizonian.[a] Similar mica schists occur in Pinal County, near the Silver King mine, where they are traversed by a great number of quartz seams and veins, which partake of the sharp folding. These rocke are lithologically similar to the mica schists of the region of Harney Peak in the Black Hills of Dakota and to portions of the Taconic Mountains in Massachusetts. Metamorphic limestone also occurs in the Catalinas in the form of white crystalline marble of good quality.

The Fortuna mine in the Gulf range near Yuma is in ancient mica slates, and the veins of lead ore of Castle Dome traverse gneissic and slaty rocks.

An extensive region of argillaceous slates is found upon Cave Creek north of the Phoenix mine. The outcrops are strong and bold, and in some places are so even and tabular as to merit the name of roofing slate.

Similar slates occur in the region between Walnut Grove and the Tiger mine in Yavapai County, and again on the eastern side of the Rincon Mountains, about six miles north of Dragoon Summit station and in close relation with the gneissic rocks in which the quartz veins carrying wolframite occur.

Ancient gneissic rocks occur in the Oro Blanco gold district and on the border of Mexico at and near Sasabi on the road from Tucson to El Plomo.

The great copper mines of the United Verde are upon lenticular, interstratified, pyritic beds and seams in ancient slates.

Pre-Cambrian rocks are well developed in the canyon of the Colorado underlying the Tonto sandstone, which is regarded as Cambrian. The Grand Canyon series of Powell, consisting of the Chuar and Unkar beds, are referred to the Algonkian, and they rest unconformably upon the Vishnu series.[b]

Cambrian and Silurian.—The best known and identified terranes of these two remote periods are found in the canyon resting upon older rocks unconformably.

The Tonto sandstone is referred to the Cambrian. The existence of a thick series of strata underlying the Devonian beds conformably in the Santa Ritas and on the flanks of the Catalina Mountains at the northeast justify the belief that the Silurian and the Cambrian are there represented, though as yet no fossils have been found by which the age of the strata can be positively determined.

There are many localities in Arizona of metamorphic sandstone, now quartzite, resting against a granitic base which probably should be referred to the Cambrian.

Devonian.—A well-defined horizon of the Devonian occurs on the northeastern slope of the Catalina Range a mile or so east and south of the Southern Belle gold mine, on a long ridge extending eastward, which I have named Coral Ridge. The

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[a] Vide report to the governor of Arizona for 1901, pages 109 to 110. See also report on the Silver King mine.

[b] See C. D. Walcott in Report U. S. Geological Survey, XIV, p. 507.

outcropping edges of a coral reef give fine specimens of coral and some brachiopods. This reef occurs in the midst of a considerable thickness of a series of limestone, argillaceous limestone, and quartzite, uplifted and conformable with heavy underlying quartzites and red shales.

Another locality near Greaterville in limestone of the Santa Rita Range affords *Spirifer hungerfordi, Atrypa reticularis, Bellerophon,* and the coral *Acerularia davidsoni.*[a] These strata are standing nearly on edge.

Carboniferous.—The rock formations of the Carboniferous era are broadly and extensively developed in Arizona. The horizontal edges are exposed in the Grand Canyon and elsewhere, while in southern Arizona they are generally uplifted and plicated. The existence of Coal Measures with beds of inferior graphitic anthracite is discussed in the report for 1901, where it is shown that graphitic anthracite occurs in thick seams in the Chiricahua Mountains and that small quantities of coal have been found in the San Carlos region. Since then Mr. Mellor, an enthusiastic observer, has sent in some fossils of the Carboniferous era from a limestone bed directly below and conformable with shales supposed to contain coal seams, but from a point near the San Pedro Valley, several miles west of the San Carlos beds. These formations invite a careful investigation.

Thickly bedded limestones of dark color and of Carboniferous age crop out in the mountains west of Tucson. The limestones and shales at Tombstone, in connection with the deposits of gold and silver ore, are referred to the Carboniferous. It is an interesting fact that the veins are most productive at the points where they intersect the limestone, and that the flats or blanket deposits, consisting of lateral enrichments or overflows from the vein fissures, generally follow the limestone and chiefly in the tops of the anticlinal folds or saddles, pitching downward with the axis of such folds away from the veins.[b]

The great copper deposits of the Copper Queen at Bisbee, which occur in the limestone, may be regarded as similarly formed by replacement of the Carboniferous limestone, the original source of the solutions being in the adjoining Plutonic rocks.

Rocks regarded as of equivalent age and formation occur at the Cananeas, and again at the Azurite near Tucson, at Clifton, and at Helvetia and Rosemont. So also at the Silver Bell and other camps, notably at Snyder's claims near Dudleyville. The limestone thus reserves the title of *metalliferous limestone* sometimes applied to it. Silver ores have been taken from the limestone butte west of Tucson on the Quijotoa road, known as Snyders Mountains. Similar black limestones occur at the Total Wreck mine, and pyritous ores are in association with it.

Mesozoic.—No fossil remains of the Secondary have yet been found in southern Arizona, but the stratigraphic relations and lithological character of extensive deposits of red sandstone justify the belief that the Trias is well represented. Such sandstones are found north of Phoenix, Tempe, and Mesa, in the Salt River Valley, and again on the southern side of the Bradshaw Mountains at Castle Creek. East of Tucson, near Vails Station and Pantano, on the railway between Tucson and Benson, there are red sandstones and shales which are probably Triassic, and a prolongation of the broad area of red sandstones and shales between the Whetstone Mountains and the Santa Ritas extending southward toward the Huachuca Mountains, and exposed along the railway from the San Pedro Valley to Crittenden.

There is also a wide area of red beds between Oracle and the San Pedro at Old Camp Grant which are not conformable to the uplifted quartzite, limestones, and conglomerates. It is well known that the Trias is largely represented south of the international boundary line in Sonora. Extensive beds of red sandstone and shale there stand on edge and attain a great thickness.

Auguste Remond has shown that Triassic rocks are extensively developed in western Sonora, Mexico, and that the Cretaceous is found in the Sahuripa Valley.[c]

The great and well-defined gold and silver bearing quartz vein of the Commonwealth mine at Pearce, in Cochise County, is probably in Secondary rocks associated with andesitic intrusions and breccias.

For descriptions of the Secondary formations of the plateau region reference is made to the reports and descriptions by Powell, Dutton, Walcott, and others of the United States Geological Survey.

The following, relative to the little-known region of the Carriso Mountains, in the extreme northeastern portion of Arizona, is from a report by Professor Hayden.[d]

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[a] See report to the Governor of Arizona, 1901, p. 110.

[b] Vide Tombstone and its mines, by W. P. Blake, New York, 1902.

[c] Proc. California Academy of Sciences, May, 1864, p. 153, and also p. 252, March, 1866.

[d] Hayden Annual Report, 1875, p. 274–276.

These mountains were examined by Holmes in 1875 and again by Cross,[a] who described the group as differing from the other groups of the plateau country in being "rather a remnant of an isolated plateau than a cluster of peaks." The average elevation of the table-land is about 9,000 feet and Pastora Peak, the highest point, reaches but 9,420 feet. The area is about 50 square miles. It is deeply cut into by erosion on all sides, as well shown by a panoramic view, Pl. XIV, of the report cited. Escarpments of mesas bordering Navajo Creek and its branches present abrupt slopes. The topography is comparable with that of the El Late Mountain group, 25 miles northeast, in the southwestern corner of Colorado.

The peculiar mesa structure is due to the hard, unyielding nature of the intrusive igneous magmas which lie between the nearly horizontal sedimentary beds of secondary age. Holmes says: "The masses of trachyte were not found over the surface of the country, but lodged between the sedimentary strata producing a more or less symmetrical doming of those beds that were not penetrated." Red sandstones were observed interbedded with sheets of trachyte, and Cretaceous beds were recognized. Cross described the igneous rocks as hornblende porphyrites almost identical in character with those of the El Late group, and closely allied in their structural relations, at least with those of the Henry Mountains. He regards them as thick sheets rather than laccolites, a form "no doubt connected with their occurrence in sandstones of the Trias or Jura, in firm bedded rocks."

Tertiary and Quaternary.—The great mammals once roamed over the surface of Arizona. This is attested by finding their remains at different distant places. The skull of an elephant was exhumed near Yuma, and is now in the Territorial University Museum at Tucson. Two finely preserved molar teeth of the mastodon were found in the peat of the large spring at Andrades rancho; another was dug up at Fort Bowie. At Greaterville, on the east side of the Santa Ritas, the horn cores of a gigantic species of Bos were dug from the placers. These cores are massive and long, indicating an animal of unusual size and breadth or spread of horns. Such fossils indicate the former presence of a much more extended and varied vegetation than now exists, and a much greater rainfall.

There are also evidences of extensive lakes in the Pleistocene period. The valley of the San Pedro exhibits a great thickness of horizontal lacustrine clays, generally of red color, extending from near the Mexican border on the south northward to and beyond Benson, on the Southern Pacific Railroad, where they are cut through by the river to a depth of 600 feet or more. An artesian boring in the bottom of the valley penetrates these sediments 500 feet deeper, giving a thickness for the deposit of over 1,000 feet.

Below Benson there are interstratified with these red clays extensive deposits of snow-white volcanic ash mixed with the siliceous shells or frustules of diatoms. This diatomite has been described by me,[b] and figures of some of the more interesting species are given in the Transactions of the Wisconsin Academy of Science. It is the opinion of Dr. D. B. Ward, of Poughkeepsie, an authority on these microscopic forms, that they represent marine conditions, or at least that most of the forms are marine. It therefore seems probable that estuarine conditions existed at a late period, a view sustained by the absence of any decided barrier to the inflow of ocean water in case of a subsidence of the region.

The detrital deposits around the mountain ranges, of which mention has already been made, are developed upon a grand scale in southern Arizona, and may be regarded as subaerial deltas, the result of the outpouring floods from the canyons and arroyos of the mountains, chiefly during a period of much greater rainfall than we now have.

The rich alluvions of the chief rivers of the Territory should here be mentioned, especially those of the Gila and Salt rivers, of the Colorado, the Santa Cruz, and the San Pedro or Quiberis.

All these valleys give evidence of streams of former greater volume than they now have. And yet it is found that wherever irrigating ditches or the cutting of roads or traveled paths extend across these alluvial areas, the cutting power of the streams is exerted with disastrous effect, hundreds of acres of fine farming land often disappearing by cutting away during a single flood. This is particularly noticeable along the San Pedro and the Santa Cruz, where wide river channels now exist in former cultivated fields.

The extreme fertility of the alluvions of Arizona is not so surprising when we reflect that they are derived from about every known variety of rock formations, granitic, plutonic, volcanic, and sedimentary.

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[a] Fourteenth Annnal Report U. S. Geological Survey, part 2, p. 209.
[b] Trans. Am. Inst. Min. Engrs., May, 1902.

Interesting experiments and observations have been made upon the silt-carrying capacity of some of the Arizona streams by Professor Forbes, director of the United States experimental station at the University of Arizona. The wonderful fertilizing effects of overflow by silt-laden streams are shown in a strikingly convincing way.[a] The great fertility of the Colorado delta is, however, well known by its productions, which surpass in luxuriance and variety those of any other known equal area in the United States. This fertile area becomes the more prominent by contrast with the surrounding desert conditions.

On the lower part of the Colorado River at Yuma there are high banks of ancient loess-like alluvions far above the present reach of the floods.

Granite.—The localities of granite are numerous throughout Arizona. There is, however, one broad central area of coarse-grained porphyritic granite, generally gray in color with soda feldspar which weathers freely and leaves large blocks and bowlders of disintegration upon the surface. Petrographically it much resembles the typical granite of Belihen in the Vosges. This granite is found in the Santa Rita Mountains at Helvetia; in the Huachuca Mountains on the east side facing the San Pedro Valley; in the Santa Catalina range at the northern end at and around Oracle, from which it extends northward to Mammoth and beyond it toward Riverside, the Superstition Mountains, and beyond them to the Salt River east of Florence. It underlies the tufas and lavas of the Gila Buttes at the head of the Florence Canal. Throughout this extended area it presents, generally, a broad, flattened surface, the result, probably, of disintegration, and does not rise in peaks or needles. It is the foundation rock of the area mentioned. It is overlaid by the ancient conglomerates, quartzites, and limestones of the Palæozoic series. It is probably post-Carboniferous in age. Another outcrop of similar granite is found at Yuma.

In the gold fields area, Superstition Mountains, where important gold-bearing quartz veins have been worked, this granite includes belts and patches of ancient sediments, such as quartzites and limestones, dislocated, broken, and detached from the main bodies of their formations and much metamorphosed by inclusion in the granite magma.

West and north of Oracle the granite is characterized by quartz veins traversing it, carrying crystals of black tourmaline, schorl, thus showing boracic emanations or segregations. So far no tin ore has been found. There are, however, argentiferous and auriferous quartz veins. The extended granite area of the Prescott region is formed of granite of a somewhat different composition. At the point of rocks on the railroad north of Prescott the granite rises in sheets and pinnacles, giving a peculiar and picturesque topography.

In the Tombstone area the eruptive rock generally known as "granite" is more accurately described a granodiorite. It is a very compact gray rock of medium grain which weathers in such a way as to leave large globular masses or bowlders of disintegration, confusedly piled on the surface. These make excellent building blocks and the rock has been used for the foundations and pillar blocks of the heavy hoisting and pumping machinery at the deep shaft of the Consolidated Tombstone Mines Company on Contention Hill. It was also used for the large monument erected over the tomb of Scheffelin, the discoverer of Tombstone. The picturesque granite area northeast of Tombstone in the Dragoon Mountains known as "Cochise's Stronghold" is another outcrop on a large scale of similar granodiorite.

There is a fine development of light-gray colored granitic rock near Deeples Valley. The bowlders of disintegration are very large and are picturesquely embowered in oak trees.

According to Whipple's survey in 1853 granite is found at the southern base of the great extinct volcano, San Francisco Mountain. Mr. Marcou called it a great mountain of red scienitic rock. Many other localities are given. The underlying rock at the base of the Aztec Mountains is granite. This is overlain by sandstone and limestone. An abundance of granite and gneiss is found in the Aquarius Mountains; so also in the Cerbats.

The rocks at Castle Dome, where lead ore and fluor spar are mined, are compact, fine-grained mica and clay slates standing nearly on edge and traversed by numerous compact chocolate-colored porphyritic dykes, or intrusions, which apparently bear a close relation to the mineralization.

Plutonic and volcanic.—There are two chief centers of the exhibition of the phenomena of volcanoes on a grand scale. One is in the plateau region, the other in the extreme southwest. The plateau is dominated by a group of extinct volcanic cones, from which, at a remote period, vast volumes of flowing lava were poured out. San Francisco Mountain, a few miles north of Flagstaff on the Atlantic and Pacific Rail-

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[a] See Bulletins of the Agricultural Experiment Station, Tucson, 1902–1903.

way, is a cone of vast dimensions, reaching a height of over 10,000 feet, and mantled with snow above the forest line for a great part of the year. An annular succession of peaks marks the rim of a former gigantic crater. It is a conspicuous and magnificent mountain as seen from any direction, especially from the Bradshaws, near to Prescott. It was a landmark for Whipple's overland survey in 1853, as for others making their way westward through the great Coconino Forest. Whipple gives a lithographic view in his report (p. 80), and notes that it rises at least 5,000 feet above the surrounding plateau. A description is also given in the report on the geology of the route (p. 46, Vol. III, of Pacific Railroad Surveys).

Bill Williams Mountain is another extinct volcano of great size, about 40 miles southwest of San Francisco Mountain. The lava from this mountain was traced for 20 miles or more west of the peak by Whipple's survey.

Whipple, or Cygnus Mountain, in a line of elevations some 12 miles in length, west of the Aztec Mountain, consists of volcanic rock and granite. These are the sources of great lava streams, which occupy a great part of the surface between the Aztec and Aquarius mountains.

In the extreme southwestern part of Arizona there are extensive evidences of former great volcanic activity, such as the lava fields crossed by the Southern Pacific Railway at and near Mohawk station, and the mountain ridge known as Malpais, extending into Sonora, and possibly connected with the great extinct volcano there known as Pinacate, near the head of the Gulf of California.

All these lava flows and volcanic cones are geologically of comparatively modern date, but other and very ancient lavas are known and are buried under the deposits of geologic ages, but are revealed to us by the cutting out of the formations by the Colorado River.

The pre-Cambrian igneous rocks of the Unkar Terrane, Grand Canyon of the Colorado in Arizona, have been studied and described by Prof. Charles D. Walcott,[a] who observes that—

"Rarely has the geologist an opportunity to study such a series of contemporaneous interbedded igneous rocks as that dissected and laid bare in the wall of the Grand Canyon."

These rocks were first observed by Major Powell, who wrote:[b]

"This region of country was fissured and the rocks displaced so as to form faults, and through the fissures floods of lava were poured, which, on cooling, formed beds of trap or greenstone. This greenstone was doubtless poured out on dry land, for it bears evidence of being eroded by rains and streams prior to the deposition of the overlying rocks."

The igneous rocks were also noted by Captain Dutton, who saw them where the comparatively narrow gorge of the Marble Canyon expands well out into the much ampler width of the Grand Canyon. The location is described by Professor Walcott as in northern Arizona, between 35° 57′ and 35° 17′ north latitude and between 111° 47′ and 112° west longitude. Altogether there is about 18 miles of exposure of the outcrop of the lava beds, exclusive of the lower beds. In a preliminary note the beds were described by Walcott as follows:

"The summit of the Grand Canyon group is a massive magnesian limestone 100 feet in thickness that overlies red sandstone resting on a massive belt of greenstones 1,000 to 1,300 feet in thickness. This belt is broken up into eight principal flows by partings of sandstones deposited between the flows. The first coulée flowed over the level ocean bed, in which 5,000 feet of sediment, that now forms a reddish-brown sandstone, had accumulated on the upturned and eroded edges of the Archean, the few layers of limestone and the one flow of lava 150 feet in thickness near the base scarcely serving to break the great sandstone series."[c]

In his later monograph he writes "all of the igneous rocks appear to have come from true fissure eruptions. In the upper portion of the Unkar terrane the lava flowed out in successive sheets, a sufficient period of time intervening between the larger flows to permit of the accumulation of from 3 to 5 feet of sand on the surface of the various flows."

Volcanic ejections in the form of tuffs and lava are common in various parts of the Territory. See under the heading of "Tufa."

Rhyolites are also abundant, especially in the central portion of the Chiricahua

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[a] Fourteenth Annual Report U. S. Geological Survey, p. 503.

[b] Report of Explorations in 1873 of the Colorado of the West and its Tributaries, 1874 (8°), p. 18; Exploration of the Colorado of the West and its Tributaries, 1875 (4°), pp. 81, 213.

[c] Pre-Carboniferous strata in the Grand Canyon of the Colorado, Arizona, Am. Jour. Sci., Vol. XXVI, 1883, pp. 440, 441.

Mountains and in the Galiuro range between the two great granitic and metamorphic ranges of the Catalinas and Rincons and the Graham Mountains.

Plutonic intrusions in the form of dikes of porphyry diorite and diabase are numerous throughout Arizona, and are generally accompanied by the familiar phenomena of alteration of the rocks which they traverse. Thus, at the Azurite copper mines, near Tucson, and at the Olive camp, the dark-colored "blue" limestone is changed to white limestone adjacent to the dikes, with at the same time the formation or development of garnet rock and copper sulphides. Similar conditions are well shown at the copper-ore croppings, near Dudleyville and at Mineral Creek.

The great porphyrite dike traversing the Paleozoic strata at Tombstone, forming, in connection with quartz, the great lode of the district, cuts the strata in a nearly vertical plane and is highly mineralized with gold and silver. Other dikes in the district also show a close relation to the mineralization.

The copper-ore supply of the Arizona Copper Company at Clifton is now drawn chiefly from the great porphyry dike, which was doubtless the source of the lateral enrichment of the adjacent limestone by supplying solutions of copper which were promptly precipitated on coming in contact with the soluble rock.

Tufas or tuffs.—Formations coming under this designation are abundantly developed throughout Arizona, especially near Tucson and Phoenix and on the Sonoyta and Upper Santa Cruz River from Calabasas to Nogales.

These rocks are used for building, and are particularly described in the report for 1899, to which reference is made.

Wind erosion.—The high winds upon arid plains drive clouds of dust before them, especially where the surface has been broken up by travel with the formation of roads and loose earth. A large amount of material is thus transported from place to place, and where there is loose sand, and the conditions are favorable, sand dunes are formed—as, for example, upon the Colorado Desert across the Arizona line in California—but they are not common in Arizona.

The attention of travelers upon the desert bordering the Great Colorado of the West is often arrested by broad stretches of pebble-covered plains, or mesas, glittering in the sunlight from the myriads of polished surfaces, giving at a distance the appearance of a sheet of water. It is not alone the well-rounded, polished surface of these pebbles which commands attention, but, in addition, their nearly black or dark-brown color, and, above all, their uniform distribution in a level sheet, covering the plain in a continuous layer or pavement like a vast mosaic without sand or soil. Hundreds of square miles along the Lower Colorado, especially in Yuma County, Ariz., and on the borders of the Colorado Desert in California, are thus covered. It is evident that the former extent of such pebbly plains was much greater than now, for the continuity of the mesa is broken into by the numerous dry arroyos or "washes" formed during exceptional showers or deluging rains.

In some places there is an underlying bed of pebbly conglomerate—a mixture of pebbles and sand; in others the pebbles rest on a sandy, earthy foundation. The rounded pebbles are distinctly alluvial in origin, and pertain to the ancient Colorado drainage system; but it is not comprehensible that such regular layers of polished pebbles could have been left by subsiding floods or river action.

Attention was early directed by me to these remarkable plains, first examined in 1853, when exploring for the United States and seeking a practicable route for a railway to the Pacific coast.[a] The cut and polished surface of the pebbles and of loose rocks on the desert was then correctly explained as due to the attrition by wind-driven sand and dust, but an explanation of the pavement-like surface and the accumulation of pebbles and rock fragments in close contiguity was not attempted.

It appears certain that the surface sheet of pebbles, and in many localities of small fragments of rock and bits of fossil silicified wood, is the result of an accumulation by the gradual removal by the wind of sand, silt, or finer materials from around and below the pebbles, undermining them, removing their support, and permitting them to fall to a lower level, where they accumulate by concentration until the whole surface is closely covered by fragments too large and heavy to be moved away by the wind. Such a deposit of pebbles or fragments may thus represent all that were originally distributed through several feet of thickness of sand and lighter alluvions. In this way there may be a removal of a large amount of fine materials from the general surface of a region, lowering its level until by the complete covering and protection of the surface by the concentration of the heavier fragments æolian denudation is arrested and the further lowering of the surface is stopped.

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[a] Report of a Geological Reconnaissance in California, Vol. V, Pacific Railroad Reports, pp. 108, 112, 117.

CONDITION OF LIVE STOCK.

During the past year the climatic conditions obtaining throughout the Territory of Arizona have been peculiarly unfavorable to the stock raiser. The long-protracted drought, covering a period of about nine months, resulted in a general shortage of range feed, and in the irrigated districts precluded the possibility of raising the necessary crops of artificial grasses demanded by the feeders. Losses on the ranges have been heavy, but the results could not be otherwise, considering the abnormally large yield of calves during the preceding year.

The law governing and regulating the handling of live stock, which was enacted in 1903, and to which casual reference was made in last year's report, has demonstrated the wisdom of the legislature that enacted it. Its operation has brought about a condition of security and confidence such as has never before existed, and to a great extent offsets the losses in other directions.

The system of inspection for health and for brands and marks has been brought up to a high standard of efficiency, and while improvements can still be made, the progress in this direction has been phenomenal.

The law is administered as in the past by a board consisting of three members, all of whom are practical cattlemen. An office is maintained in the capitol at Phoenix, where all records are kept; a secretary and such other assistance are employed as are necessary for the proper conduct of the office.

The Territory is divided into forty inspection districts, each of which is in charge of a competent cattleman, and as many deputies are employed as are necessary to attend to the work of inspection, the number varying from 80 to 100 to meet the conditions and demands.

The functions of the inspector are to inspect for health and for marks and brands, at the railway loading stations, at the place of exit from the Territory, and at all places where neat cattle are gathered to be driven off their range for any purpose, or that are being driven away from their usual range, * * * and to make a record of such inspection, giving the number, kind, brands, and marks, and for whom inspected. A copy of such record is immediately forwarded to the office of the sanitary board and there permanently filed.

It is also the duty of said inspectors to inspect all cattle purchased for slaughter and make report to the board of the number, kind, brands, and marks.

The law of 1903 vested in inspectors the power to seize and sequestrate "any live stock the ownership of which is questioned," and provides a proper legal process for determining the disposition of such stock. This provision was made necessary from the fact that prior to 1903 the certificate of record of brand was by law made prima facie evidence of ownership, and where cattle were found branded with a recorded brand of a person not the owner of the animals no adequate remedy could be had.

Under the operation of this provision the inspector or officer making seizure is required to immediately report the facts to a judge of the district court or justice of the peace, according as the value of the property seized may come within the jurisdiction of either court, and it is the duty of such official to issue or cause to be issued a citation addressed "To all whom it may concern," setting forth a seizure, with

a description of the animals, commanding them to appear on a certain day and show cause why the said property should not be forfeited to the Territory. This gives the true owner an opportunity to prove his property without reference to brands and marks, or lacking such proof of ownership the stock is condemned and sold, the proceeds reverting to the license and inspection fund.

Under the provisions referred to (sections 5, 6, and 7, law 1903) there have been tried 48 cases involving 433 head of stock, of which 289 head were condemned and sold by order of the courts, and after costs were deducted the sum of $1,104.96 was turned into the license and inspection fund, the other 144 head being given to the true owners on presentation of proof of ownership.

The benefit which the legitimate stockman derives from this law can not be overestimated, as it at once checks the stealing of cattle by depriving the thief of the fruits of his labor, as the burden of proof is placed on the claimant, and the moneys derived from the sale of unlawfully branded stock whose true owners can not be found at once becomes available for the prosecution of violators of the law.

A number of criminal cases have been successfully prosecuted, and in two particular cases the most important results have been had. The leaders of two of the best organized gangs of cattle rustlers that ever operated in the Territory are now serving sentences of five years each in the Territorial prison at Yuma, as a result of vigorous and persistent work on the part of the inspectors, with the help of the Arizona rangers. But for the fact that funds were available with which to successfully gather and hold the burned cattle as evidence, and defray other expenses incidental to stubborn and protracted litigation, this result could not have been accomplished.

The moral effect of the conviction of these men, who had ample means to contest their cases to the very end, has demonstrated to others of their kind that justice in Arizona is no respecter of persons, and that criminal cases are tried without reference to the condition or circumstances of the accused, and has resulted in the breaking up of organized cattle stealing.

The amount expended in attorney's fees covering the cases referred to, both civil and criminal, is $2,376.20, and in connection therewith there has been paid to sheriffs, for costs of holding and feeding stock under seizure and as evidence, $599.50, all of which has been derived directly from the stockmen themselves in licenses, brand tax, and the proceeds of the sale of cattle seized and condemned. So that it will be seen that although in some particular cases the expense of prosecuting was apparently great, after deducting the amounts realized from the sale of animals condemned, the average cost to the Territory of trying these cases was but $57.41 each.

The brand-tax law, which was generally recommended by the cattlemen prior to its passage, has proved to be a popular measure in view of the results. Of the series of 1903–4 there were 2,414 receipts issued, for which the sum of $6,035 was received. However, a portion of this was turned in prior to the period covered by this report, although the law did not become actually operative in this connection until July 1, 1903.

While as a revenue-producing measure the brand tax has greatly contributed to the successful operation of the law, it is generally conceded that this is only a secondary advantage. By its operation owners of numerous brands are confined to the use of those certain brands

upon which the tax has been paid, and it is possible at all times to determine immediately whether a brand is being lawfully used. It enables the inspectors to discover "maverick" brands when they encounter them and to take steps to eliminate such illegal practices.

There has been a steady decline in the number of cases, both civil and criminal, that have been brought under the provisions of the law of 1903 during the last half of the year just ended. This is due to the aggressive policy that was adopted immediately upon the passage of the law, and it was demonstrated and confirmed by the courts that an adequate remedy was supplied by statute for the many illegal practices that had become traditionally and inseparably associated with the range live-stock business.

The burning of brands, rustling of cattle and horses, illegal killing, mutilating of uninspected hides, and unlawful use of brands were all dealt with as promptly as opportunity offered, and while considerable expense was attached to this line of action it was deemed best to settle these points at once and thereby obviate the necessity of the constant and protracted litigation of points that might be contested.

A list of brands upon which the tax has been paid was published and issued by the sanitary board in April. This was made necessary in order that inspectors might be informed as to what brands the tax was not paid upon so that they could enforce the provisions of the stock laws in reference thereto.

RANGE CONDITIONS.

The general conditions at the beginning of the fiscal year covered by this report were extremely encouraging. Feed was ample and a sufficiency of water was generally found throughout the range districts. A phenomenally heavy calf crop followed, and everything seemed to indicate a most prosperous year. Unfortunately, however, there was practically no snow or winter rains, and, in consequence, feed became short, water holes and courses dried up, and stock began to suffer.

The heavy calf crop, which had seemed a boon, became a distinct detriment in view of these conditions. It is probable that the losses by reason of the drought will amount to from 30 to 35 per cent as an average throughout the open ranges. In some sections the losses have been much heavier, while in others they have been nominal.

While the stockmen have suffered seriously, there can be no doubt that the result will be still greater progress in the improvement of the general run of range cattle by reason of the importation of new blood and more intensive methods of handling.

There has been a marked increase in the number of cattle slaughtered for home consumption during the year just ended, but the exports of live animals have been lighter.

The following figures convey the volume of business and movements of stock for the fiscal year: Cattle slaughtered in the Territory, 48,904; cattle shipped out of the Territory, 52,387; inside shipments, 32,079; horses shipped out of the Territory, 5,161; hogs, 4,573.

The cost of maintaining the inspection service in salaries to inspectors and deputies was $12,910.83. Too much credit can not be given the Arizona Rangers for the valuable cooperation they have extended to the sanitary board in detecting and bringing to justice violators of the law. Without their assistance the efforts of live-stock inspectors would in many cases have been futile.

SANITARY CONDITIONS.

The general sanitary and health conditions of the live stock of the Territory has been excellent, due to the stringent laws that are in force and the efficient manner in which they have been administered.

This branch of the work is in the hands of the Territorial veterinarian, who works under the direction of the board. No outbreaks of any contagious disease have occurred, and isolated cases that have been discovered and promptly dealt with have been traced to outside sources. Under the regulations in force all importations of live stock are subject to inspection by the Territorial veterinarian when in his opinion such inspection is necessary, and a complete history of the live stock imported is at all times available for reference. Owing to the statutory safeguards that have been provided, Arizona is practically free from the stringent Federal restrictions placed on nearly all the range States and Territories.

SHEEP.

The abundant rains of the calendar year 1903 made dry feed plentiful upon most of the winter ranges, and sheep went into the winter in fine condition, but the drought from October and not ending at the close of the fiscal year was the worst that the sheep-breeding districts have experienced in the history of the Territory. There was practically no green feed on the winter ranges this spring and very little on the summer ranges. The water supply for stock constantly grew more limited, preventing the grazing of much of the best ranges during the spring and summer and necessitating the purchase of water along the line of the railroads at enormous expense to the growers.

The loss of sheep from straying and scattering upon the range has been very heavy, but the actual loss from lack of food and water of sheep held in the bands has been surprisingly small. The lamb crop, as might be expected, has been very small. In many instances it is practically nothing. The average increase will probably not exceed 20 per cent, and it is questionable whether or not there will be lambs enough raised in the Territory to keep the old stock good.

The extra expense sheepmen have been put to in caring for their herds for the past ten months has been enormous. They have been compelled to employ twice the number of herders usually required and all other expenses have increased in proportion. Upon the whole, woolgrowers have lost more in the extra expense of running their herds the past season than by actual loss of sheep and lambs. The future, however, looks more hopeful.

OSTRICH INDUSTRY.

In the Salt River Valley the raising of the ostrich is carried on successfully, and the industry is fast becoming one of great commercial importance. In 1893 Mr. Josiah Harbert, of Phoenix, imported 16 birds from South Africa, which he placed on a farm a few miles from the city of Phoenix. A number of the birds died after the long voyage and the change of food and climate, and very little progress was made during the first few years. However, when the birds became acclimated and their care was more thoroughly understood, they began to thrive. The hatching was done by means of a large incubator and proved very successful. It was found that the birds raised in the Salt

River Valley were several inches taller than the native bird and the feather of finer quality. Full grown, the ostrich stands 8 feet and weighs 200 pounds. The male has black plumage and the female drab, the male producing rich, glossy feathers far superior in quality to those of the female. The feathers are plucked every eight months, and are sold as high as $125 a pound in eastern markets. As much as a pound of feathers is taken from one bird at a single clipping.

The principal food of the ostrich in the Salt River Valley is alfalfa, and they are allowed to run in large pastures, where they feed contentedly and fatten easily. There are two farms in the Salt River Valley at the present time, and the total number of ostriches here is over 1,600. The farms are located near Phoenix, and a small display farm is maintained close to the city for the benefit of visitors and for the sale of plumage to the local trade. The industry is advancing, and the climate of the valley seems to be particularly adapted to the successful raising of these birds. Of the four farms in the United States the two in the Salt River Valley are the most important, and the industry seems to be a profitable one.

NATIONAL GUARD.

Under the efficient military guidance of Maj. Ben. W. Leavell, U. S. Army, adjutant-general of Arizona, the National Guard of the Territory has been placed in most excellent condition. The mustering in of the Second Cavalry Troop at Morenci is a sign of the new interest shown in the guard in the Territory, and the mustering out of Company E, First Infantry, at Mesa, for inefficiency, shows the strict discipline and the standard of excellence required.

The guard was equipped during the year with two Gatling guns, one of them having been installed with the Second Cavalry Troop, at Morenci, the other being retained at the capitol for emergency use should the guard be called into service in the Territory. All the ordnance necessary to equip all of the organizations has been obtained. The clothing and equipage necessary to place the entire guard in camp or active service has been received. It is the intention of the adjutant-general to give each organization in the Territory all equipment requisite for prompt response to orders for active duty, thus eliminating the necessity of furnishing the supplies from the headquarters at Phoenix.

Adjutant-General Leavell visited and inspected all of the organizations in the Territory during the month of February, and in November Col. James H. McClintock made a special inspection of Company E, at Mesa. Captain Holbrook, U. S. Army, inspected all of the organizations in April and May.

The adjutant-general reports that while the guard is far from what is to be wished, there has been marked improvement in all of the companies, excepting Company H, at Yuma, which, he says, does not show the interest necessary to make an efficient company.

ARIZONA RANGERS.

The conditions that demanded the organization of the ranger force in 1901 are greatly improved, although the presence of the rangers is still needed to bring about in a few years the complete victory of law

and order over the outlaw element. In a country where vast areas are open ranges lawlessness is more or less rampant, and unless restricted the Territory suffers through the depredations and desperate acts committed. To police the ranges and give protection to the remotest settler the force of rangers was organized. At the time of the formation of the company the conditions were alarming. Some of the large cattle outfits were threatened with ruin by the cattle rustlers. Herds of stock were driven boldly out of the Territory, in many instances the rightful owners of the herds being defied by the thieves. Bands of cattle rustlers existed and flourished at the expense of legitimate stock owners. Several desperate bands rode the ranges defiantly, the county officers of the law seemingly unable to put a stop to their high-handed operations.

Since the rangers were organized these bands have been dispersed. Many cattle thieves are confined in the Territory prison, having been captured by the rangers. Cattle rustling has become an unprofitable and unsafe pursuit, and the watchfulness of the rangers detects it wherever it is attempted in the Territory.

The reports of the captain of the Arizona Rangers, filed weekly in the office of the governor, show the work performed by each member of the force. Complaints filed with the governor are at once brought to the attention of the captain, and investigation is not delayed a moment. The rangers usually operate in squads of two or more, as their work is more effective in this way. They are used as peace officers, preserving law and order wherever they may be in the Territory. The force is composed of fearless men, trained in riding, roping, trailing, and shooting. The very best men to be found are enlisted, and they come for the most part from the interior points of the Territory, where they can be detailed for important work with assurances of success owing to their knowledge of the country.

During the fiscal year ended June 30, 1904, there were 453 arrests made by the rangers. Of this number 5 were charged with murder, 155 with felonies, and 293 with misdemeanors. One man was killed by the rangers in resisting arrest. No member of the ranger force has been killed during the year, although a number of them have been wounded in fights with outlaws.

The rangers are under the command of Captain Rynning, an efficient officer, fearless in the performance of his duties. John J. Brooks is lieutenant, and there are 4 sergeants and 20 privates. The men are constantly on the go, making long rides after outlaws, and taking risks without fear. They are men of good judgment, careful, and exacting. Their services to the Territory can not be overestimated, and I dare say the statement showing the number of arrests made does not represent half of the work done by these men. A great deal of good accomplished is not reported and is probably known to but few.

The personnel of the Arizona Rangers is not known to the general public, as secrecy is required in order that the most effective work may be done. Rangers are often operating in a community without the knowledge of the residents, and their presence is not known until they have completed their work.

There can be no question but that the proper manner of policing the ranges is by the formation of an organization such as Arizona possesses in its rangers.

The headquarters of the rangers is located at Douglas, Cochise

County, a town on the Mexican border, as the greater part of their work has been in the counties along the line.

The rangers have captured a large number of United States offenders, principally smugglers, Chinese unlawfully in the country, persons selling whisky to Indians, and others, all of whom have been delivered to the United States authorities. They have also captured and turned over many fugitives from justice from other States and from Mexico. The conditions throughout the Territory during the past year have been most gratifying. Law and order have prevailed, and the last band of organized rustlers has been broken up. There has been no strike rioting, mob violence, or lynching; in fact, there has not been a train robbery or lynching since the organization of the ranger force.

The most cordial relations exist between the Mexican authorities and the rangers. They have at all times assisted and cooperated in the following and apprehension of fugitives from justice and the recovery and return of stolen property back to this country. Col. Emilio Kosterlitzky of the Mexican army, Capt. Quintano Molina of the Cananea Gendarmeria, and the chiefs of police of Cananea, Agua Prieta, Naco, and Nogales, Sonora, have rendered valuable service and aided the rangers in their work along the border, thus making the border towns of Sonora no longer a place of refuge for criminals from the United States.

The relations of most of the sheriffs and other peace officers of the Territory with the rangers have been most amicable, and they have usually assisted them in their operations.

Captain Rynning reports that he has experienced some difficulty in securing the assistance of many of the various district attorneys of the Territory in the prosecution of criminal cases, particularly those arising under the live-stock laws.

The principal work of the rangers is on the ranges in connection with the live-stock interests of the Territory. They have worked in conjunction with the Live-Stock Sanitary Board and the Arizona Cattle Growers' Association, from both of which organizations they have received valuable assistance and support. During the year the rangers have recovered and restored to their rightful owners a great many strayed and stolen horses, cattle, sheep, and goats. The present stock laws are accomplishing much good, and under their operation cattle stealing has been practically wiped out in Arizona.

Captain Rynning further reports that his men are constantly kept riding the ranges and attending round-ups. A number of the rangers have been acting as live-stock inspectors, particularly along the Mexican border, thereby causing a saving to the Territory of the salary of five or six inspectors, as the rangers do this work without extra compensation.

The moral effect of having the rangers in the Territory, and by their constant appearance on the ranges, in the mountains, and patrolling the Mexican line has been most effective in keeping down crime. They cover those parts of the Territory not easily accessible to other peace officers, i. e., the mountains and cattle ranges. Their work in this regard has resulted in a saving in fees and mileage to the various counties.

From Captain Rynning's report is shown that each member of the organization rides on an average 390 miles per month, or a total for the entire force of 10,140 miles. This patrol on horseback of the

Territory is most satisfactory, considering that the force consists of only 26 men.

Captain Rynning recommends that some steps be taken toward the compiling and publishing of a list of the fugitives from justice from the various counties of the Territory similar to that published by the State of Texas. It is a necessary aid to peace officers and many fugitives would be apprehended through its agency. He also recommends that 26 Krag-Jörgensen carbines be issued to the rangers under the same terms and conditions as they are furnished to the Territorial militia.

IRRIGATION AND WATER STORAGE.

In a region absolutely dependent upon artificial irrigation the subject of reservoir construction is one of supreme importance. The supply of water for irrigation under the present conditions is too uncertain to build upon. Great undertakings in agriculture have to meet great risks, and often with disastrous results. When consideration is given to the fact that, with the exception of one or two showers, rain did not fall in the Salt River Valley in Arizona since September, the condition of agriculture at the close of the fiscal year in June can be imagined perhaps more vividly than described. The protracted drought lessened the flow of the streams to such an extent that many farms were deprived of their share of the water passing through the canals. The fact that there are but few ranches ruined by the drought is indeed a tribute to the system of irrigation in this valley. With the assistance of storage dams this condition would have been entirely alleviated.

The rivers have great drainage areas, and during times of flood the water rushes from mountain and mesa, swelling these water courses to their utmost capacity. The flood water soon passes off to the sea, leaving the river in its normal condition and the great stretches of irrigable lands unbenefited.

The subject of water storage has received scientific attention for many years, and the reclamation of the arid lands is now a great national question, receiving the best thought of legislative and executive officials of the Government. Arizona is proud of the attention given to the claims presented by the Geological Survey, and the selection by the honorable Secretary of the Interior of the Tonto and Colorado river projects, which combined represent an expenditure of $6,000,000.

The Tonto dam will benefit the ranches of the Salt River Valley and add many thousand acres to the area now under cultivation.

This reservoir, when created by the construction of the dam, will cover 14,000 acres. The height of the dam will be 245 feet and the depth of the water stored at the dam will be 190 feet; the dam will be 165 feet thick at the bottom and 16 feet thick at the top. In length it will be 200 feet at the base and 653 feet at the top. When completed the Salt River dam will be the highest in the world, and the storage capacity of the reservoir will be greater than almost any three artificial reservoirs in the world, being about 1,300,000 acre-feet of water, or sufficient to cover 1,300,000 acres of land 1 foot in depth.

It has been understood that the creation of this artificial reservoir by the construction of this immense dam is but the forerunner of further systems of water storage in aid of irrigation in Arizona, and

that eventually upon all streams in the Territory, where proper sites can be found, systems of irrigation works will be constructed, and that where flood-water supply is found sufficient to guarantee more than one reservoir will be created upon a single stream in order that control of all surplus water may be had. That this is the intention of the Government all fully believe.

Work upon the Tonto dam was practically inaugurated during the past fiscal year. On July 1, 1904, the progress made, as given by Mr. L. C. Hill, the Government engineer in charge, was as follows:

On that date 4,000 feet of tunnel work on the power canal had been completed ready for the concrete lining. The total amount of tunnel work is 8,700 feet, so it is nearly half finished and work is in progress in all the tunnels. The excavation work on the power canal is moving slower than it ought to, owing to a shortage of men. A number of teams have been idle for the reason that there were no men to handle them.

The sluicing tunnel is about half finished, 230 feet of it having been completed on July 1. Work is now being prosecuted from both ends.

The contractor for the cement mill is now putting up the steel construction, the material for which is all on the ground. A large amount of the cement machinery is now in Globe or on the ground ready for placing.

The temporary power house is practically completed, the engines and boilers are set, the line shafts for the machine shops are up, and the machinery is ready to place.

They have already manufactured some red brick and are now grinding material for the firebrick.

In the road work there are now five big, hustling camps at work—one at Fish Creek Hill and two on each side of there. The road camp nearest to the dam is engaged in building a new piece of road designed to eliminate two crossings of the river, and when this is done the road will be entirely on the south side, never crossing the river at all. The other camp beyond Fish Creek is engaged in bettering a 7,000-foot stretch of road that is now passable with a fair load, but is sandy and needs improving for heavy hauling.

There is one road camp between the central camp and Mormon Flat smoothing down the high trail on the Fish Creek plateau, and the other is Mr. Utting's camp at this end. He has about 50 men employed, and on Thursday moved camp to Mormon Flat, though the road has not quite reached that point. It may be driven over now, though, with a light rig, for Mr. Utting took in a wagon with a half-ton load. He expects to work his men both ways from Mormon Flat and increase his force as fast as possible. A stage line runs from Mesa Mondays, Wednesdays, and Fridays to the end of the road, where it connects with a pack train.

Directly and indirectly, including freighters, etc., there are now between 1,000 and 1,200 men at work on the entire enterprise. Between 325 and 350 of them are being directly supplied with provisions and other equipment from the Salt River Valley, aggregating about a ton and a half of merchandise daily.

The work will be pushed ahead as rapidly as possible, and it is expected that the first benefits of the storage dam will be felt within a few years by the ranchers of the Salt River Valley.

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Under reservoir conditions the Salt River Valley will become one of the most productive areas in the world. The marvelous progress made under the old conditions, with the uncertain water supply, the great risks, and the absolute dependence upon the flow of streams, will be augmented by the certainty of water when it is most needed. The fullest capacity of the land to yield crops will be brought forth, and the adversities which have discouraged agriculturists under the old conditions will have passed into history.

That the General Government does not intend to stop with one great irrigation project is evidenced by the action of the honorable Secretary of the Interior in setting aside $3,000,000 of the reclamation fund for the construction of what is known as the Yuma project on the Colorado River. By means of a dam across the Colorado River and other works, upward of 85,000 acres of land can be reclaimed at a cost of less than $40 an acre.

Mr. F. H. Newell, chief engineer of the U. S. Geological Survey, in a communication to the Yuma County Water Users' Association, thus describes the Yuma project:

During the winter season of 1903–4 the reclamation service made surveys for the irrigation of the valley lands of Colorado and Gila rivers in the immediate vicinity of Yuma, Ariz., and in the Yuma Indian Reservation in California, looking toward the utilization of the Colorado River for their water supply. These surveys included the making of a topographic map, on the scale of 100 feet to the inch, at the Laguna dam site, and soundings for bed rock and foundations at that point. On the California side of the river, along the route to be occupied by a possible canal, a map has been made, on the scale of 100 feet to the inch, with a small contour interval. On the Arizona side of the river a map has been made, on the scale of 100 feet to the inch, from the Laguna dam site to Yuma along the canal line, and in addition a number of angle line surveys have been run for the exact determination of the location for the canal. Below Yuma, transit surveys have been made for the location of the canal. At the crossing of the Gila River a map has been drawn, on a scale of 100 feet to the inch, and soundings made for bed rock. Preliminary location surveys have been made for a complete set of levees from the Laguna dam site to the Mexican line, on both sides of the Colorado River, and also on each side of the Gila River.

A drainage system has been projected upon the topographic maps which have been made of the entire district to an elevation of 150 feet above river level, and to the scale of 2 inches to the mile. Surveys have been made to base estimates upon for pumping plants for irrigation and drainage. Mr. H. A. Storrs, consulting electrical and mechanical engineer, has examined the ground and made plans and estimates therefor.

A board of six consulting engineers has been through the estimates of the engineers in charge in detail, and the report which is submitted is the result of the deliberations and best judgment of all these men, and all estimates and plans have been brought to the complete satisfaction of each person.

In the Yuma Indian Reservation on the California side of the river it is estimated that there will be within the levees 16,000 acres, and on the Arizona side it is estimated there will be 91,000 acres under the system, making a total of 107,000 acres. Of this area, it is estimated that 5,000 acres next to the Mexican line in Arizona will be subject to overflow in such a way as to temporarily exclude them from the irrigable areas, and in addition a small percentage of the remaining lands are known to be in sand dunes that will be above the level of the canal lines. In all it is estimated that on both sides of the river there will be a total of 86,700 acres of irrigable land, of which 73,100 acres are in Arizona. The water supply of the Colorado River is adequate for the irrigation of this area.

A number of different designs for the diversion weir have been estimated upon in the study for the most economical type that may be built in safety at this point. Several different locations have also been examined to determine the best place for this structure, bed rock having been explored for with diamond-core drilling machinery at all possible dam sites between Yuma and Picacho. As a result of these explorations the Laguna weir site has been selected as the most desirable one for the construction of a weir to serve the lands near Yuma, a high dam and high line canal

being considered impossible. The type of weir selected is one that has been tried during the last fifty years at numerous places in India and Egypt under similar conditions, 3 dams having been constructed on the Nile River within the past fifteen years on practically this same plan, all having served their purpose efficiently and being in operation to-day. This type of weir consists of a loose rock structure with a paving of stone 1½ feet in thickness on the downstream slope, the structure being tied together with three parallel walls of steel and concrete run longitudinally between the granite abutments on the two sides of the river, and the entire structure being further made secure by an apron of loose rock pitching 10 feet in thickness and 50 feet in width at the lower toe of the dam below the sloping pavement. The height of this weir is to be 10 feet above low water and the slope of the downstream side is 12 feet horizontal to 1 foot vertical, with the 50-foot apron below. The design calls for the upper core wall of concrete to rest upon a row of sheet piling driven into the bed of the river.

The handling of the silt of the Colorado is one of the most difficult features of this undertaking. It is known that its amount is very large. The river is on a grade of approximately one foot to the mile above the Laguna weir site, so that this weir 10 feet high will make a settling basin of relatively quiet water approximately 10 miles in length above it. At each end of the weir and constructed in solid granite rock will be a sluiceway 200 feet wide and excavated to the depth of low water in the river. These sluiceways will be closed by large gates operated by hydraulic machinery. The diversion canals will take their water above these gates from the sides of the sluiceways. The area of these sluiceways being so great, the water movement toward the canal will be slow, and most of the sediment will be deposited before reaching the canal intake. When this has accumulated to a considerable extent the sluice gates will be opened, and it is estimated that their capacity will be approximately 20,000 cubic feet per second each. This great volume of water passing through the sluiceways when the gates are opened will carry out with it the sediment deposited above the intake of the canal. The ordinary low-stage flow of the Colorado River is from 3,500 to 4,000 cubic feet per second, so the capacity of each of these sluiceways will be about five times the low-water flow of the river. These figures are given for purposes of comparison only. As the result of a number of experiments it has been found that the principal quantity of silt is carried along near the bottom of the river, and that the surface water is relatively free from sediment. It is planned, therefore, to take the water into the canals by a skimming process over a long row of flashboards, so that the entire capacity of the canal can be furnished by drawing but one foot in depth of water from the surface of the river.

As a still further precaution it is proposed to construct the first 3,000 feet of canal on each side of the river of such size that the movement of water through it will be slower than one foot per second. These settling basins, as they are called, would be either excavated from granite, or where the section is in earth they would be paved. At the lower end of these settling basins gates will be arranged to discharge into the river, so that the water can be drawn down to the level of the stream, and a grade of 11 feet in 3,000 feet thus obtained. At the lower end of the settling basins the canals proper will begin. The silt that will enter the settling basins in spite of the two precautions noted above, will be permitted to settle in these basins, and at such intervals of time as may be necessary the sluice gates at the end of the settling basins will be opened and sufficient water drawn into this section through the headworks to scour it out. Every portion of this weir and headworks as designed would be of rock, concrete, or steel, with the exception of the sheet piling, which will be driven entirely below the water level, and so will not decay. Every portion of the weir will be what is known as permanent construction. Such character of work will, of course, be expensive, but it has been proved to be sound economy to build in this way.

The capacity of these canals at their intakes will be 1,200 cubic feet per second on the Arizona side and 200 cubic feet per second on the California side. The amount of silt that would be daily delivered into the Arizona canal, if diversion were made directly from the stream, would approximate 17,000 cubic yards of wet mud by volume. It is not believed to be possible for a canal to continuously operate successfully for the irrigation of lands along the valleys of the Colorado River unless some very substantial arrangements are made at the headworks for the handling of silt, and this is believed to be a justification for the expenditure proposed for these headworks; also the water must be held to a fixed level at the canal heading for all stages of the river. This structure will cost approximately $1,000,000.

Careful study has been made of the existing canals in the vicinity of Yuma and Imperial to determine the shape that they naturally assume, and the roughness of the bottom and sides, which tends to retard the velocity. Based upon this data, the

canals have been designed so they will carry water at a higher velocity throughout than will be found in the settling basins above their head, and of such velocity as will permit of a minimum loss by seepage and evaporation. The gates and drops of these canals and the Yuma bridges are designed as steel concrete structures. A distribution system has been estimated upon to furnish water to each 160-acre tract. There will be small areas of land in the upper Gila Valley, and below Yuma, that will have to be served by pumping plants that will lift the water from 5 to 7 feet. The power for doing this will be furnished from a water-power plant to be erected above Yuma at a drop in the main canal. This power plant will also be used in connection with the drainage system.

One of the most difficult problems in connection with this project is the crossing of the Gila River. It has been considered necessary to make this perfectly safe, and for this purpose a structure has been designed that will cross beneath the bed of the river, the top to be several feet below the lowest point of the stream bed. This structure will be of steel and concrete, some 3,300 feet in length.

Because of the annual rise of the Colorado River, a large portion of the lands along this stream are subject to annual overflow which practically prevents residence thereon, as well as the farming of them without protective works. The levee, therefore, is considered an essential feature of the enterprise. The shape of levee adopted is one that has been developed by years of experience along the Mississippi River. It will have a slope of 3 feet horizontal for 1 foot vertical on the water side, and 2½ feet horizontal to 1 foot vertical on the land side; it will be 8 feet wide on top, and be built 5 feet above the highest watermarks of the year 1903. These levees will be 4,000 feet apart (one on each side) along the Colorado River, and 3,200 feet apart along the Gila River.

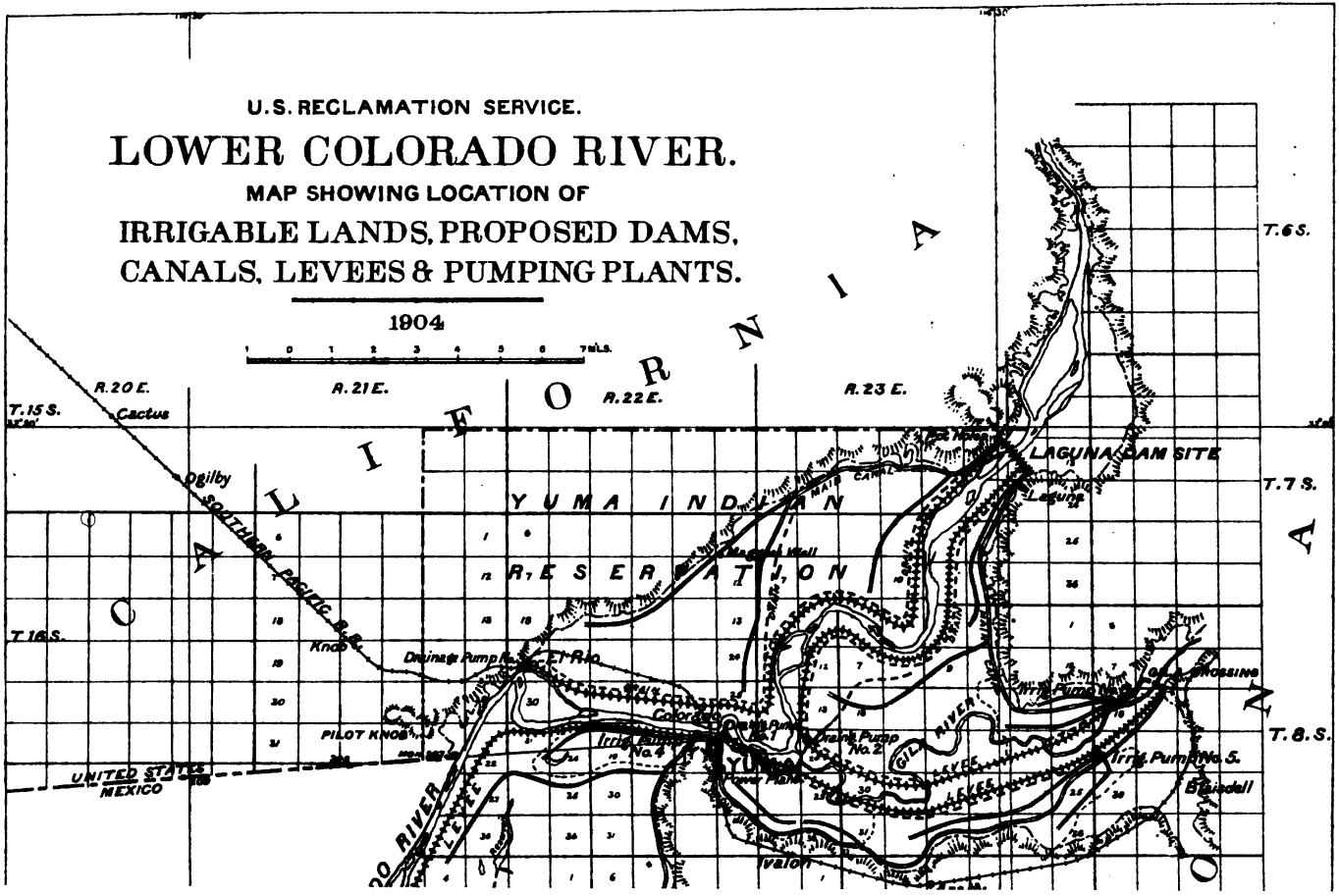
Because these lands are so flat, and the level of the water in the ground so near the surface, it is considered necessary, for their permanent safe irrigation, to supply a drainage system. A main drainage canal has been designed to run through the central portion of the areas to be irrigated, and when possible the natural drainage lines of the country will be utilized, deepening them with a steam dredger to such depth that they will carry off the water returning from irrigation or seeping through the levees during the high-water stage of the river.

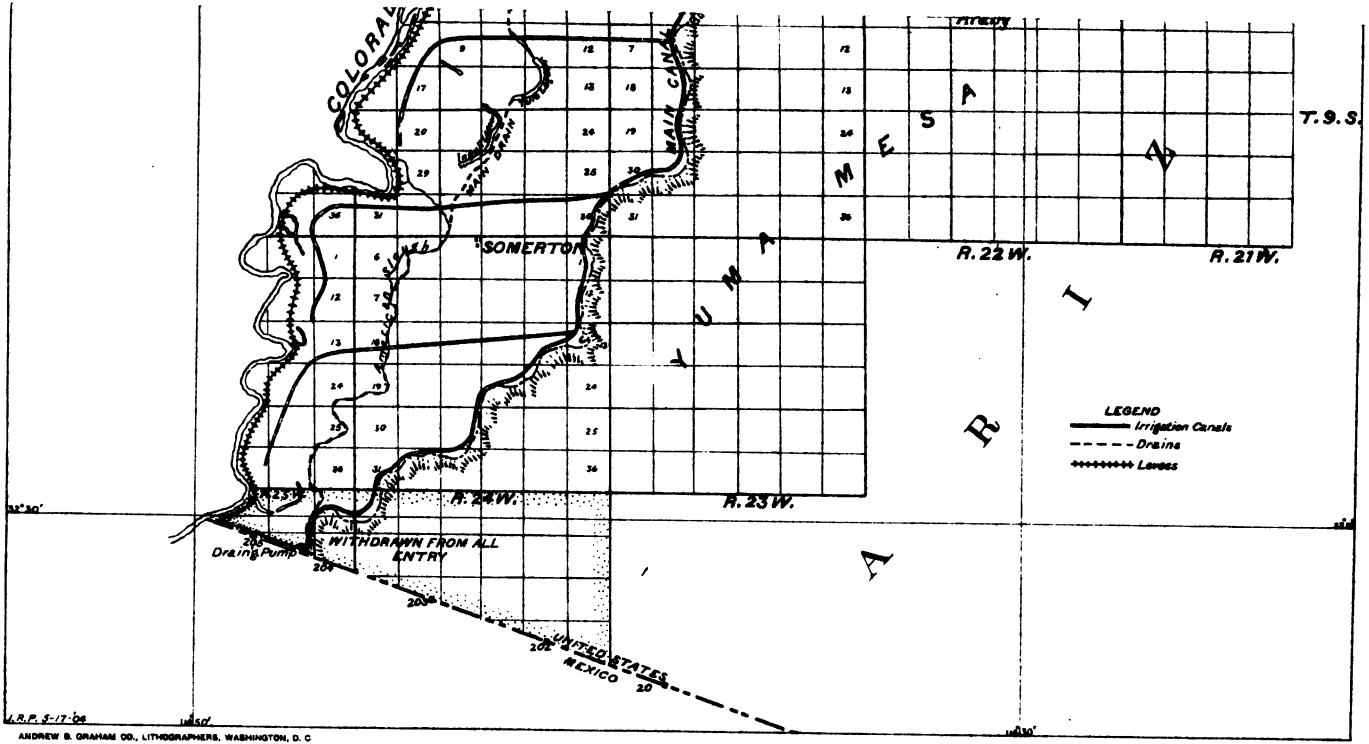
When lands in any district tend to become alkaline they may be connected, by means of local drainage canals, with this main drain, and in this manner they could be kept free from alkali by holding down the level of the ground water. During the greater portion of the year when the river is low, this drainage water would be discharged into the stream, but when the river is in flood its elevation will be such as to prevent a discharge into it from the drains. A pumping plant has therefore been designed to lift the drainage waters over the levees during the flood period of the river to prevent the lands becoming water-logged.

The whole system, as planned above, is one looking to the permanent reclamation of this district by means of irrigation, levee, and drainage works. All portions of the system to be made of steel, concrete, or earthwork.

The reports of the Department of Agriculture on the character of the soils of this valley, as well as past farming experience, indicate that they are exceedingly fertile. The silt of the Colorado River, all of which can not be removed at the head works, has high fertilizing properties. Under these conditions and with proper handling of the system, the valley should be perpetually fertile. The entire cost of this enterprise, providing all the area is irrigated which is indicated above, will amount, according to the estimate, to about $35 per acre irrigated. It is entirely possible, however, that as this construction work proceeds this cost may be somewhat increased or lessened, although an effort has been made to cover all contingencies, and the estimates of cost have been liberal. The price will range near $35 per acre, this to be paid for according to the provisions of the reclamation act and regulations of the Secretary of the Interior, in ten annual installments after the first delivery of water. The annual charge for maintenance and supervision of this system will be very low and probably materially less than $1 per acre. There will be no charge for interest, profit, or taxes.

In order to keep the price as low as that estimated upon and to proceed with the construction of the works, it will be necessary for all of the landowners of the portion of the district that is in Arizona, under the projected canal, to enter into an agreement with the Secretary of the Interior through their local water users' association for the payment of the water when it is delivered to them. The reclamation service has made the surveys and estimates required for the Secretary of the Interior concerning the costs and character of these works, but it will be absolutely necessary for the local landowners to submit to the Secretary, through their local associations, the contracts for the acceptance of the water; and also to provide for the rights of way


U.S. RECLAMATION SERVICE.
LOWER COLORADO RIVER.
MAP SHOWING LOCATION OF
IRRIGABLE LANDS, PROPOSED DAMS,
CANALS, LEVEES & PUMPING PLANTS.
1904
R.20 E.
R.21 E.
R.22 E.
R.23 E.
T.15 S.
T.16 S.
T.6 S.
T.7 S.
T.8 S.
Cactus
Dgilby
Southern Pacific R.R.
Knob
PILOT KNOB
UNITED STATES
MEXICO
YUMA INDIAN
RESERVATION
Drainage Pump No. 1
El Rio
Main Canal
Levees
Colorado River
Irrig. Pump No. 4
Irrig. Pump No. 1
Drain. Pump No. 2
GILA RIVER
Yuma
Irrig. Pump No. 5
Bonsall
Ivalon
LAGUNA DAM SITE
Laguna
Gila Gravity Main Canal
Gila Gravity Pump
Gila Crossing
CALIFORNIA
ARIZONA


COLORADO
MAIN CANAL
SOMERTON
YUMA MESA
T. 9. S.
R. 22 W.
R. 21 W.
R. 24 W.
R. 23 W.
WITHDRAWN FROM ALL ENTRY
Drain Pump
UNITED STATES
MEXICO
LEGEND
Irrigation Canals
Drains
Levees
32° 30'
114° 50'
114° 30'
U. R. P. 5-17-06
ANDREW B. GRAHAM CO., LITHOGRAPHERS, WASHINGTON, D. C.

uired for the levee, power plants, transmission lines, etc. When these contracts agreements have been prepared they will be given careful consideration by the partment.

The Secretary of the Interior has set aside $3,000,000 of the reclamation fund for construction of this project, contingent upon the action of the landowners of this ley and their entering into contracts with the Department in accordance with the ovision of the reclamation act passed June 17, 1902.

Presented herewith is a map showing the location of the irrigable nds under the Yuma project, the proposed dams, canals, levees, and umping plants.

AVAILABLE DAM SITES.

There are numerous available water-storage sites in this Territory. Many of them are large, demanding extended research and study, and some are small, where the expenditure of a few hundred thousand dollars would construct a dam which would store water for 10,000 or 20,000 acres of land. We can congratulate ourselves that the Government has now in hand two of the very largest projects in the Territory; and interest centers in the success of these. The smaller ones are also receiving attention, as appears in the report of the U. S. Geological Survey presented herewith.

On April 18, 1904, a letter was addressed to the governor of Arizona by Mr. Charles D. Walcott, Director of the U. S. Geological Survey, in which he asked for suggestions regarding the extension of the work of measuring streams and investigating the water resources of the Territory for the purpose of further irrigation and industrial development. The reply sent from this office was necessarily brief, covering the salient points in the great field of operation. The subject requiring extended research, my suggestions only superficially covered the ground, as it appeared to my mind from personal observations during a residence of many years in Arizona.

In order to extend the benefits of the reclamation law throughout the Territory, I suggested that the water supply of the Santa Cruz Valley be given attention; that the many small reservoir sites in different parts of the Territory be exploited, and that subsidiary dams be constructed on the upper tributaries of streams, rendering assistance to those farmers who are struggling along with the uncertain water supply of their sections and furnishing available lands for thousands of settlers.

The success of the work undertaken in this Territory by the U. S. Geological Survey is a source of pride to the people of Arizona. The researches extend to many sections of the Territory, and many important discoveries have been made. The recommendations made show the wisdom of the Government engineers.

The advisability of extending the surveys already inaugurated to the upper tributaries of the Salt and Gila rivers was suggested with the view of securing available reservoir sites on these streams and their tributaries. The upper stretches of the Little Colorado River, which heads in the vicinity of the White Mountains, also furnish a rich field for research and investigation.

It was further suggested that surveys for the location of underground water be extended, with the aim of furthering irrigation enterprises whose bases of operation lie in power pumping plants.

SAN CARLOS DAM SITE.

For many years the San Carlos reservoir project has been discussed in Arizona, and its feasibility determined by the United States Geological Survey. That it comes next in line with the Tonto and Yuma projects in importance is admitted by all. Indeed, the San Carlos site was talked of long before any others were mentioned, and it was the general belief in this Territory that it would be selected for construction before any others would be taken up. However, the wisdom of the honorable Secretary of the Interior in selecting the Tonto site has never been questioned, and the construction of that dam and the selection of the Yuma project give encouragement that the San Carlos site will come next.

The keen disappointment felt by the people of the Middle Gila and Casa Grande valleys over the failure of the San Carlos site to win favorable consideration is accounted for most naturally by the fact that they were for years led to believe that their project would be the first to receive attention under the reclamation law. The failure of the project to receive attention disheartened the settlers; in many instances it brought severe losses. In the Middle Gila and Casa Grande valleys to-day thousands of acres of lands have reverted to the desert, owing to the shortage of water; farther on the Pima and Papago Indians have suffered, and the Government is forced to provide rations for the destitute families. The San Carlos dam would provide water for the white settlers as well as the Indians.

The Government has already expended $26,000 in ascertaining the feasibility of water storage on the Gila. The United States Geological Survey has determined that the Gila River is the only available source of permanent water supply for the Pima Indians, and it has pronounced the San Carlos site feasible. The following conclusions have been published in Irrigation Papers No. 33, United States Geological Survey, concerning the San Carlos dam site:

That it is feasible to construct a masonery dam at Riverside at a cost of $1,989,605, including damages for right of way and diversion dam at the head of the Florence canal, forming a reservoir with a capacity of 221,134 acre-feet.

That it is feasible to increase the height of the dam at the Riverside dam at least 70 feet higher than the one estimated upon, giving an ultimate reservoir capacity of about 650,000 acre-feet, which would not be filled with solid matter short of sixty-seven years.

That it is feasible to construct a masory dam at San Carlos at a cost of $1,038,926, including damages for right of way and diversion dam at the head of the Florence canal, forming a reservoir of 241,396 acre-feet capacity, and that the water supply is ample to fill such a reservoir in the years of minimum flow, and that the volume of the storage will irrigate at least 100,000 acres in addition to the irrigation of the lands of the Indians.

That it is feasible to construct a dam at San Carlos at least 70 feet higher than that contemplated in the estimates, forming a reservoir whose ultimate capacity would be approximately 550,000 acre-feet and whose probable life of usefulness would be sixty-three years before being filled with silt.

That provision should be made in the working plans for these ultimate extensions suggested and the right of way reserved in the reservoir basin for the additional area that may ultimately be flooded.

That the working plans for the San Carlos dam should be drawn to permit of the complete utilization of all power which may be developed from the head of the water issuing from the reservoir and steps be taken for realizing upon the full commercial value of the power.

Estimated cost of San Carlos dam on a basis of 74 feet to bed rock:

Rubble masonry, laid in concrete, 94,730 cubic yards, at $6	$568,380
NOTE.—with sand cement at $4.63 per barrel, or $4.28 per cubic yard. (See Duryee's report.) This figure is based on half of the mass being large rock and half concrete.	
Excavation, foundation, pumping, etc	150,000
1 semicircular tower of concrete, 13,632 cubic feet, at 50 cents	6,816
1 tower, same diameter inside, 60 feet high, 4,388 cubic feet, at 50 cents	2,119
2 tower houses, including the semicircular base of concrete, at $750 each	1,500
10 inlets for towers, at $500 each	5,000
2 balance valves, at $1,000 each	2,000
2 balance valves, at $750 each	1,500
610 linear feet of footbridge, at $10	6,100
5 miles of railway, moved, at $10,000 per mile	50,000
New irrigation system above the Indian agency	20,000
Damage to agency and post buildings	60,000
Low-water diversion tunnel	10,000
Wooden crib diversion dam at head of irrigation canal	20,000
	903,415
Contingencies, 10 per cent	90,341
Engineering, 5 per cent	45,170
Total	1,038,926

Total number of acre-feet stored is 241,396, at a rate of $4.30 per acre-foot.

The San Carlos dam site and the lands to be benefited by its construction are described in an article written by Mr. Arthur P. Davis, of the United States Geological Survey, published in the National Magazine in March, 1902, excerpts from which are respectfully presented as follows as showing the feasibility of the proposition from an eminent engineering source:

The Gila River Indian Reservation is occupied largely by the Pima, Maricopa, and a limited number of Papago Indians. Our earliest knowledge of these Indians indicates that they have long been industrious farmers and irrigators, as they continued to be for many years after the acquisition of Arizona by the United States. Wheat, corn, and vegetables have been raised in large quantities, and they have manufactured earthernware, baskets, and a few woolen and cotton articles. They gave assistance to the early white settlers, and their doors were always open to peaceable whites and Indians when hard pressed by savage tribes. Until recently these tribes, living in small villages, have supported themselves, and their progress toward civilization has been regarded as one of the encouraging features of the Indian problem. Their agriculture was carried on entirely by irrigation, with water diverted from the Gila River.

Disregarding the rights and necessities of these Indians, the United States has been disposing of arid lands in the valley of the Gila River above the Indian reservation, which could not possibly be rendered of value except through the use of the waters of this river. Gradually such lands have been brought under irrigation until in a course of nearly 200 miles and by innumerable ditches the waters of the Gila have been entirely diverted. During several months of the summer there has been in recent years little or no water in the Gila River on the Indian reservation.

It is universally recognized that the deprival of these Indians of their irrigating supply is not only a grievous hardship, but a great wrong, both in law and equity. The United States Government, which is the sole guardian of the rights and interests of these Indians, is bound by every consideration of justice and economy, as well as sound public policy, to restore to them a sufficient quantity of water to enable them to resume the practice of agriculture as of old.

It is now necessary to issue considerable sustenance to the Indians, and in a very short time such charity, while permitting the Indians to degenerate in a most deplorable manner, will become a serious expense to the United States, much greater than the interest upon the total cost of the irrigation works recommended. These, if built, would not only give the Indians an ample water supply, but bring under cultivation 100,000 acres of public lands and furnish homes for 40,000 white inhabitants.

It is estimated that 40,000 acre-feet of water per annum is necessary for these Indians to support themselves by agriculture. A thorough knowledge of the country and careful investigation of all possibilities establishes the fact that the only available means of providing a reliable supply of this quantity of water annually, is by storing the flood waters which now flow to waste in the channel of the Gila River.

By far the most feasible and economical reservoir site available for this purpose is situated on the San Carlos Indian Reservation, about 2 miles below the mouth of the San Carlos River, where the Gila River enters a narrow canyon. A dam constructed at this point to an elevation of 142 feet above the bed of the river, would form a storage reservoir with a capacity of 240,000 acre-feet, i. e., it would impound sufficient water to cover 240,000 acres 1 foot deep.

The estimated cost of the structure, including the diversion works, a liberal allowance for all damages, and 10 per cent for unforeseen contingencies, is $1,190,000. The water drawn from the reservoir for irrigation would flow down the channel of the river as it does naturally and be diverted at a favorable point.

Considering water supply, irrigable land, and the remarkable facilities for building and maintaining a large storage reservoir, there are few reservoir sites in the arid region equal to the one at San Carles. If built, it will not only solve the problem of supporting and civilizing three tribes of Indians, but it will furnish a reliable supply of water for the reclamation of 100,000 acres of Government land, now a barren desert, entirely without value in its present state. This land should be disposed of in tracts of 20 or 40 acres under the provisions of the homestead act, with a charge sufficient to cover the cost of the work.

It has been abundantly proved, both in California and Arizona, that under the intensive cultivation possible with irrigation in a semitropical climate, 20 acres is sufficient land for the support of a family. Including the urban population, which will necessarily accompany such a development, homes will be provided for not less than 40,000 souls, and under the terms suggested, any industrious man can make a comfortable home in Arizona as easily as was done half a century ago in Illinois and Missouri.

The argument in favor of the construction of a reservoir for the storage of the waters of the Gila River by the United States Government is stronger, perhaps, than for any other project in the country, for the following reasons:

1. The Government has expended large sums of money for the introduction of irrigation on the Indian reservations, where it is desired to educate the Indian into agricultural habits as a means of his civilization. This is a well-established and wise public policy, and has already been productive of much good, but it is always in the nature of an experiment, and more or less difficulty and uncertainty is attendant upon the attempt to induce the Indians to accept this mode of livelihood. In the present case we have tribes of Indians who have for centuries been engaged in agriculture by irrigation, and who were until recently the only successful irrigators in Arizona. These Indians have been deprived of their water supply through the agency of the white man, directly encouraged by the United States Government. It is an imperative obligation of honor that their supply should be restored to them, and the only practical means of this restoration is by storage on the Gila River.

RÉSUMÉ OF RECLAMATION WORK IN ARIZONA.

I am indebted to Mr. H. C. Rizer, Acting Director of the United States Geological Survey, for much valuable information concerning the operations of this department in Arizona during the year.

TOPOGRAPHIC WORK.

During the fiscal year 1903–4 four surveying parties of the United States Geological Survey were engaged in topographic work in Arizona. Level lines from the Nogales datum were connected with those based on the Phoenix datum, and surveys were made of areas in southern Arizona comprising 2,674 square miles. These areas form what are known as the Bright Angel, Vishnu, Tucson, Patagonia, and Nogales quadrangles. The Bright Angel and Vishnu quadrangles (in the Grand Canyon Forest Reserve) will be mapped on the scale of 1 mile to 1 inch; the Tucson (Santa Cata Forest Reserve), the Patagonia

(Santa Rita Forest Reserve), and the Nogales quadrangles on the scale of 2 miles to 1 inch. These surveys were made under the direction of Mr. F. E. Matthes and Mr. T. M. Bannon.

GEOLOGIC WORK.

Two reports on geologic work previously done in the Globe and Bisbee mining districts have been published during the year as Professional Papers 12 and 21 of the Geological Survey, and a third report, on the Clifton mining district, is in preparation.

HYDROGRAPHIC WORK.

The hydrographic work in this Territory has been carried on under the reclamation law, Mr. Arthur P. Davis, supervising engineer, having general charge.

The relative merits of the San Carlos (Gila River) and Salt River reservoir sites were considered, the opportunities for the storage of water in various parts of the Territory were investigated, and a study was made of the underground waters of the Salt River Valley which may be made available by pumping.

Salt River project.—This project involves the construction of a dam 220 feet high, at an estimated cost of about $3,000,000, for the storage of 1,200,000 acre-feet of water. The dam site is on Salt River, about 60 miles above Phoenix and immediately below the mouth of Tonto Creek. Water stored at this point will be turned down Salt River and utilized on 160,000 to 200,000 acres of land in the vicinity of Phoenix. Most of the land is in private ownership, but all the surrounding public land has been withdrawn pending survey. An association of water users has been formed for the purpose of dealing with the Secretary of the Interior and guaranteeing the carrying out of the purposes of the law and repayment of cost of reclamation.

Contracts have already been entered into for generators for temporary power plant, machinery for Portland cement plant, mill for Portland cement plant, electric motors, excavation and completion of sluicing tunnel, telephone line from Arizona dam to Livingstone, water wheels, etc., for power plant, and power canal and auxiliary works in Tonto basin. A waterworks system has been installed for the purpose of supplying potable water to the camp and town at Roosevelt. The total number of men at present at work on this project is about 1,000.

The cadastral survey of the irrigable lands in the Phoenix Valley has been completed.

San Carlos project.—This site is on the White Mountain Indian Reservation, below San Carlos, on Gila River. A dam at this point will impound about 240,000 acre-feet of water at a cost of little over $2,000,000. The stored water will be turned down Gila River and taken out for use in the valley in the vicinity of Florence and on the Gila Indian Reservation near Sacaton. A detailed topographical map has been made of the dam site and a contour map partially made of the reservoir. Observations of river flow and sediment are being continued and reconnaissance surveys are being made of possible reservoir sites on the upper Gila.

San Pedro project.—This project is located in the southeastern part of the Territory, along the San Pedro River, near Benson, Cochise County. No estimate can be made of the feasibility of the project until the amount of water supply has been settled. A gauging station has been established, and observations will be continued until sufficient data are collected to form a basis for a reasonable estimate of the water supply.

Sacaton Indian Reservation.—An investigation has been made looking to the irrigation of about 10,000 acres of land by pumping water from wells. The estimate of the cost of this project is from $30 to $35 per acre. It seems certain that a large amount of fairly good water is available for irrigation by pumping in the whole district southeast of Phoenix, the power for pumping to be supplied from one of the power plants along the Salt River.

Colorado River work.—During the winter of 1903–4 surveys were made for the irrigation of the valley lands of Colorado and Gila rivers in the immediate vicinity of Yuma, Ariz., and in the Yuma Indian Reservation in California. A weir site has been selected at Laguna, to serve the lands near Yuma, a high dam and high-line canal being considered impracticable. The project as planned looks to the permanent reclamation of this district by means of irrigation, levee, and drainage works.

The surveys made included the making of a topographic map on the scale of 100 feet to the inch at the Laguna dam site, and soundings for bed rock and foundations at that point; also a map on the same scale along the canal line to Yuma, and a number of angle line surveys have been run for the exact determination of the location of the canal. Preliminary location surveys have been made for a complete set of levees from the Laguna dam site to the Mexican line on both sides of the Colorado and Gila rivers. It is estimated that there will be within the levees on the Arizona side 73,100 acres of irrigable land under the system. Plans and estimates and specifications for the letting of contracts are now being prepared, and if the holders of the private lands in the Yuma Valley accept the provisions of the reclamation act bids will be advertised for early in August, and it is hoped that work of construction may be begun in October. A water users' association has been incorporated and organized in a manner satisfactory to the officers of the reclamation service.

Reconnaissance.—Various reconnaissance surveys have been made in the southern part of the Territory, principally on streams tributary to the Gila. In particular, an examination of the underground waters has been carried on, under the direction of Mr. N. H. Darton, by Mr. Willis T. Lee. Mr. Lee has found that there are definite ancient channels filled with gravel, from which water in considerable quantities may be pumped. Some of this water is alkaline, but a great portion of it may be utilized for the reclamation of arid land.

AGRICULTURE AND HORTICULTURE.

The agriculture and horticulture of Arizona is necessarily becoming more and more intensive in character. The limited water supply for irrigation, the long growing season, the variety of crops possible, and the excellent home markets constitute both natural and commercial conditions favorable to diversified farming and maximum production.

The irrigable areas are limited only by the scanty water supply, excepting along the Colorado River, where as yet water is far in excess of land under cultivation; consequently, out of 72,000,000 acres of the Territorial area we find, approximately, but 5,541,547 acres privately owned, of which only about 250,000 acres are actually irrigated. This area is destined to increase as irrigators improve their methods of farming, when storage reservoirs make possible the utilization of flood waters, when reduced cost of pumping makes available the underground supply, and especially when the Colorado River is more fully utilized. Along these lines it may be reasonably predicted that irrigated lands within the Territory will easily double their present area within a few years.

The grazing industries also, which are now in large part supported on the public lands, are capable of much-needed improvement when legal conditions are such that it shall be possible to so administer the open range that properly regulated use may be made of its resources.

In agriculture the uncommon variety and amount of marketable produce possible is due to prevailing conditions of soil, irrigation, and climate. The soils of Arizona, as is usual with the soils of arid regions, are rich in most of the elements of fertility, requiring only the ever needful water, skill, and industry in their management to secure abundant returns. The fertility of cultivated soils in irrigated regions is further assured by the deposit of silt brought upon the land by irrigation water. The problems of fertilization, which become so serious in humid sections, are therefore of much less importance here and not to be so carefully reckoned with in connection with the future of our agriculture. The most marked influence in connection with agriculture and horticulture, especially in southern Arizona, is the climate. From January to June the temperature resembles that of spring and early summer in the latitude of Kentucky. From June to September the climate is of subtropical fervor, while from September to November there is a second mild season of temperate weather. The winter season, from November to January, though subject to sharp frosts in southern Arizona, is not seriously or even uncomfortably cold.

Owing to this combination of seasons a remarkable variety of crops may be found in the same locality at different times of the year. Strawberries, which flourish in Greenland, may be found on common ground with the date palm from Sahara. Alfalfa, the great forage of the arid West, flourishes alongside of wheat, corn, and sorghum, respectively, characteristic of Minnesota, Illinois, and Kansas. Oranges, lemons, and olives from California may be found in the same neighborhood with peanuts and sweet potatoes from Virginia. In brief, many of the leading crops of both temperate and subtropical countries which are not affected by a too arid atmosphere or by the frosts of winter flourish in southern Arizona. In northern Arizona, where the temperatures more resemble those of northern Illinois, many more distinctively temperate-region crops flourish, such as corn, potatoes, apples, and various small fruits.

The earliness of the season for some crops, such as oranges, melons, tomatoes, apricots, and other export products, is an advantage to the Arizona farmer, while the strong demand for farm supplies in the many mining camps and towns of the Territory maintains a fair average of produce values.

What these values are may be judged by the following figures relating to certain crops grown on the Experiment Station Farm during 1901:

Crop.	Yield per acre.	Gross value per acre.	Cost of producing and marketing per acre.	Net value per acre.
	Pounds.			
Wheat	2,150	$22.55	$10.25	$12.30
Potatoes	3,600	85.00	34.50	50.50
Tomatoes	12,300	225.00	75.00	150.00
Strawberries	5,000	500.00	150.00	350.00
Melons	27,000	140.00	26.00	114.00
Egyptian cotton	400	68.00	48.00	20.00
Corn	1,735	18.00	9.50	8.50

STAPLE CROPS.

Alfalfa.—Probably the most important crop in Arizona is alfalfa. With from four to seven cuttings a year possible, it may be stated that probably in no considerable district within the United States does this plant yield more abundantly.

It has several values in our agriculture. First, as hay there is a constant market at good prices in the adjoining mining country, prices for baled hay ranging from $7 to $14 a ton. A more profitable disposal for alfalfa, ordinarily, is as a stock fattener. It is so employed in feeding hogs and cattle; also in connection with a thriving dairy industry. It is estimated that about $1,500,000 worth of alfalfa hay and fat cattle annually are exported from Salt River Valley. With improved methods of feeding this output can doubtless be greatly increased.

With butter now being shipped into Arizona from Kansas, it is also evident that there is yet room for the growth of the dairy industry. There are at present four creameries and cheese factories in the Territory, and a condensed-milk factory is immediately in prospect.

Another very important use of alfalfa is as a soil renovator. Our semiarid desert soils are commonly dense and deficient in humus and nitrogen—circumstances leading to a condition of poor tilth, which often makes successful culture of ordinary crops a difficult matter. Alfalfa, however, flourishes in these soils, and in so doing loosens them to considerable depths by means of its roots, and through its processes of growth and decay contributes the much-desired humus and nitrogen to the soil. In this way alfalfa serves as a preparation for other crops; and it is a matter of common observation that orchards, wheat, sugar beets, and other crops all flourish best on ground which has previously been in alfalfa.

Barley.—From early times barley has been grown in Arizona as a hay crop, being cut and baled for this purpose before maturity. Four to five tons of hay per acre is a fair yield. Certain varieties of beardless and hull-less barley recently introduced have advantages over the ordinary bearded. The yield of grain per acre is from 30 to 50 bushels.

Corn.—Although small, quick-growing varieties of corn have long been grown by the Indians and Mexicans in the Southwest, it is only within the past few years that fine crops of improved varieties have been grown by American farmers. In order that the grain may prop-

erly fill, corn must be planted in July, late enough so that in maturing it may just escape the fall frosts. With the long growing seasons it is possible, water supply permitting, to mature a crop of corn after harvesting a crop of wheat or barley.

Wheat.—Wheat is a leading staple, both as grain and as hay. It is grown as a winter and spring crop, maturing usually before the summer shortage of water occurs.

The chief variety grown is the Sonora wheat of this region, but certain Australian varieties have found favor, and effort is being made to import such new kinds as will make a better milling combination than does Sonora wheat alone. At present much wheat is imported from California by the large flouring mills in Phoenix, Tempe, Tucson, Solomonville, Safford, and Thatcher.

Other grains and forages.—Sorghum has become one of our most important forage crops, not only because of its use for stock-feeding purposes, but because it thrives on land containing considerable alkali. Grown upon such lands, the alkali is partly taken up and removed with the crop, to this extent renovating and improving the soil for other crops. The clubhead is the best and most commonly grown variety in this region.

Kaffir corn approaches sorghum in yield of forage, while Egyptian corn, an excellent drought resister, has proved to be a very promising source of grain. Cowpeas and rye may be grown experimentally, but are of minor value in this region. Oats are more grown than formerly, being, like wheat and barley, sown in with alfalfa for a first cutting of mixed hay.

Root crops.—Many of the important root crops thrive in Arizona. The common potato grows wild at higher altitudes within the Territory. In northern valleys heavy crops are grown by irrigation. In southern Arizona two crops may be grown, the principal one being planted in February and a less satisfactory one in August. Early Rose, Burpee's Extra Early, Early Andes, Bovee, and Triumph all do well, and from 4,000 to 5,000 pounds per acre is an ordinary crop.

Sweet potatoes and yams produce well in suitable soil, a specimen of the latter weighing 36¾ pounds, from the upper Gila, being on record.

Field beets, carrots, parsnips, peanuts, radishes, and turnips are all grown with success.

Sugar beets.—During the past six years the Arizona Experiment Station has devoted much time to the investigation of sugar beets, demonstrating the proper methods of agriculture, the productiveness, and the quality of this crop in the Territory. The following is a summary of the results obtained during the last two seasons:

Average of seventeen samples grown in vicinity of Pima and Safford, Ariz., 1901: Sugar in beets, 12.7; purity, 81.9; yield per acre (calculated from results on fractional acre plots), 18.6.

Average of eighteen samples grown in Salt River Valley, 1902: Sugar in beets, 15.7; purity, 81.7; yield per acre (calculated from results on fractional acre plots), 19.5.

These figures justify the statement previously made that a satisfactory yield of beets of medium and sometimes excellent quality can be grown in southern Arizona, the precautions of early planting, suitable soil, and careful cultivation and irrigation being taken. Following these investigations the Eastern Sugar Company has commenced

the erection of a beet-sugar factory near Glendale, Ariz., which, it is stated, will cost about $800,000 and will handle between 500 and 1,000 tons of beets a day. If successful this large undertaking will be a very important addition to the resources of this region.

Vegetables.—Green vegetables in unusual variety may be produced if proper attention is paid to the planting seasons. As mentioned above there are two mild, temperate seasons in southern Arizona—one extending from January to June, the other from September well into November. Certain of the more quickly growing vegetables, therefore, may be made to produce both in the spring and the fall, this double season being recognized by the more experienced residents of this section. Asparagus, beans, cabbage, cauliflower, celery, table corn, cucumbers, eggplant, lettuce, melons, peas, spinach, squashes, tomatoes, and other varieties of vegetables in yearly increasing number are successfully grown.

Fruits.—In northern Arizona, and in certain of the higher valleys where the climate is temperate in character, apples, cherries, pears, and peaches of excellent quality are grown, but only in small quantities, since the irrigated areas are small. Apricots, grapes, and raisins are shipped in considerable quantities from the Salt River Valley. Oranges and lemons of superior quality are produced in Salt River Valley and near Yuma. They have the commercial advantages of a season earlier than that of southern California, while, in addition, the fruit is uncommonly bright and attractive in appearance. This is due to the fact that the scale insects perish from the effects of the dry, hot atmosphere, leaving the fruit unmarred by their presence. Strawberries in skillful hands are a very profitable crop in southern Arizona, the entire product being marketed in the Territory. Figs grow luxuriantly in southern Arizona, but require a constant and abundant supply of water in order to yield well. Almonds have been grown with varying success. The great drawback to their culture is the late spring frosts, which are so likely to destroy the crop. For the past four years, however, the growers have in most instances succeeded in warding off the disastrous frosts by smudging their orchards at critical times. During this time heavy crops of the highest market value have been secured, especially in the vicinity of Mesa City.

Olives are a promising crop in southern Arizona. This tree requires comparatively little water, and the scale, which is so abundant upon the tree in southern California, is not found upon it here. Experts state that the trees grown in Arizona are unusually bright and attractive in appearance and their fruit of good quality. The product of the olive tree, also, either in the form of pickles or oil, may be held for the best market and is of small weight and bulk in comparison with its value, shipping charges being thus economized. It is not improbable that this fruit has a growing future in this region, since the demands for olive products is at present throughout the United States far in excess of the supply.

The date palm.—Experimental work with the date palm has steadily progressed during the year. Although large groves of these trees are found here and there throughout Sonora, many individuals having an age of 200 years or more, and although their product is a popular article of food with the Mexicans of this region, no systematic attempt has before been made on the Western Hemisphere to develop the full value of this useful tree.

The product is not only a palatable fruit, now mostly used as a luxury, but is an excellent food, especially suitable for hot climates. As a food, the date is the chief dependence of men, horses, and camels in the desert regions of Africa and Arabia, and its use as a staple in the United States is capable of indefinite increase. The annual importation of dates into the United States now amounts to about $400,000 in value, being an incentive to the establishment of a new industry, which, for climatic reasons, can only be developed in the hot, irrigated valleys of the semiarid Southwest.

The experimental date orchard, 3 miles south of Tempe, has prospered during the year, two large shipments from Egypt, Arabia, and Beluchistan having been received and planted. Eleven acres of palms are now in the ground, comprising 80 imported varieties and about 600 trees.

The large shipment brought from Algiers in July, 1900, has done surprisingly well in the new orchard, and at the present time, June, 1903, no less than fifty-nine of the transplants are bearing small bunches of young fruit. It will be several years before the best varieties for this country may be finally determined; but there is little doubt that in time this experimental work will result in the establishment of a new agricultural resource in the Southwest.

Miscellaneous products.—Bees produce an abundance of excellent honey in this region, depending in part upon alfalfa and in part upon the inflorescence of the mesquite, various acacias, and other wild vegetation. According to the Twelfth Census, Arizona is stated to have produced $67,489 worth of honey and wax in the season of 1899, largely shipped in carload lots to eastern points.

Tobacco may be grown under irrigation, but its culture has not as yet received expert attention. Much of the native product is worked up by local manufacturers, chiefly for the Mexican trade.

Experimental work with Egyptian cotton, a valuable Old World long staple variety, indicates that it produces excellent fiber here, but its commercial success is yet to be demonstrated.

In general, it may be stated that the combination of temperate and subtropical characters in the climate of this region, together with the intensive methods consequent upon irrigation, have combined to make possible an extraordinary variety of agricultural productions, for which there exists a ready market in the surrounding mining districts.

The resources and experience of the ancient cultivated regions of Egypt, Asia Minor, and India are of value to southwestern farmers, who may gain many useful suggestions from these countries.

It is interesting in this connection to note the remarkable similarity of the lower Colorado to the exceedingly rich agricultural region of the lower Nile. Like the Nile, the Colorado rises in a distant mountainous country, its lower courses traverse a subtropical and nearly rainless desert, and both rivers empty into great landlocked arms of the ocean at about 32° north latitude. Like the Nile, the Colorado is subject to a great annual summer rise sufficient to overflow large areas of its delta and border lands, which are heavily fertilized by the rich sediments brought down by the flood. Similar climatic conditions complete a resemblance which makes possible the production along the Colorado of many of the staples of the Nile, such as alfalfa, wheat, grains of the sorghum class; the date palm, fig, orange, olive, and pomegranite; Egyptian cotton, melons, and sugar cane. The future

of this district is undoubtedly a great one, though it will take some years to institute those works necessary to its development.

The agricultural experiment station.—In a new country, rapidly filling up with settlers from regions of a different agricultural character, an agricultural experiment station may make itself useful to an unusual degree. The problems presented to the newly arrived southwestern irrigator are largely foreign to his experience and difficult of solution. Reliable information, therefore, relating to soil, irrigating waters, crops, live stock, methods of farming, etc., are demanded and appreciated by our farmers.

The Arizona Station is so organized and its work so distributed as to render all possible service to the various phases of agriculture in the Territory. The administrative office and the scientific laboratories are located in the University main building at Tucson. The range reserve for the study of grazing conditions is suitably situated immediately southeast of Tucson. The station farm, where agricultural, horticultural, and stock-feeding work is carried on, is situated near Phoenix, in the midst of the largest farming district in the Territory. The date-palm orchard is 3 miles south of Tempe, Ariz., in an alkaline district, where a successful demonstration of the culture of this tree will create value for tens of thousands of acres of otherwise worthless alkaline lands throughout the Southwest.

The publications of the station, including bulletins and Timely Hints for Farmers, touch upon a wide variety of farming topics of interest to southwestern irrigators. The Timely Hints in particular, combining scientific and popular character, have proved useful to farmers, and may be had by request from the Experiment Station, Tucson, Ariz.

FERTILE VALLEYS.

There are many very fertile valleys in this Territory, and scarcely one exists that does not possess claims worthy of the attention of the United States Geological Survey. Irrigation is practiced by means of diverting the water that runs in the streams and is successful only during the favorable years. The number of acres of land under cultivation in these valleys varies from year to year according to the supply of water available. There are excellent reservoir sites located in the mountains near these valleys which might be utilized by the expenditure of a few hundred thousand dollars. In order to bring the greatest area of land under cultivation it would seem necessary that attention be given to these smaller valleys and small dams constructed where conditions warrant. Descriptions of the different valleys in the Territory follow:

Salt River Valley.—In this valley, the largest in the Territory under cultivation at this time, absolute dependence is placed in the supply of water that is carried by the canals from the Verde and Salt rivers. If reliance were placed on the natural rainfall there would be no crops, for, during the past fiscal year, the rainfall has been scarcely nothing at all. In fact there has seldom been a year of such prolonged drought. This valley is in excellent condition when consideration is given to the extreme discouragements its people have met with. It is perhaps one of the richest agricultural areas in the United States, and under reservoir conditions will become a field of labor where certain return is guaranteed.

There are 260,000 acres of land in the Salt River Valley susceptible of irrigation. At the present time there are perhaps 115,000 acres under cultivation. Owing to the scarcity of water under the present system of supplying it full crops are seldom yielded, if ever. With full crops from the lands at present under cultivation the output would be many times greater than it is to-day. It is expected that the land now under cultivation will be augmented in area by the thousands of acres of desert land in the valley when the Government dam is completed at Tonto and water stored for delivery.

The report of Mr. J. O. Dunbar, immigration commissioner of Maricopa County, deals with the manner of irrigation in the Salt River Valley. Mr. Dunbar reviews the subject as follows:

Tillage of the soil by means of irrigation possesses many advantages over dependence on the natural rainfall, as water may be applied when needed and withheld at will. Lands under irrigation yield more abundantly and produce more uniform crops than those which must look to an uncertain rainfall for moisture, and hence are much sought after and command the highest prices paid for farming land.

There are abundant evidences that southern Arizona was once densely populated by prehistoric races, but whence they came and whither they went are unsolved mysteries; but the ruins of great cities and massive temples bear mute testimony to their civilization, skill, and industry, while the ancient canals which they built, and which may still be traced from the mountain water courses for miles and miles out across the deserts in every direction, reveal to us that they were expert irrigators, and were dependent upon irrigation for sustenance in those hidden ages as we are to-day.

The prehistoric irrigation systems of Arizona were probably among the most ancient in the world, and the waters of her mountain streams have been utilized in the valleys below by each succeeding race inhabiting the country down to the present time.

The Pima Indians are the earliest irrigators in the Territory of whom we have any authentic record. When Coronado explored this region almost four centuries ago these people were found farming the lands of the Gila and Salt River valleys by the aid of primitive irrigating ditches just as their descendants are doing to-day.

In other sections irrigation is merely a help to the farmer in the production of his crops, and only serves to increase his harvest; but in southern Arizona it is an absolute necessity, as nothing whatever can be raised without it. Hence those engaged in business in the cities, and in the professions, are equally interested in irrigation with the farmer. There could be no settlement in the Salt River Valley if it were not for the canals, and consequently no towns, save those supported by the mines in distant hills.

The canal is the dividing line between the barren desert waste on the one hand, and the luxuriance of a semitropic garden on the other. No more bewildering transformation scene of the magicians' art can be imagined than that produced on an Arizona desert by the application of a little water.

Modern irrigation in the Salt River Valley began about the year 1866, when a few hardy pioneers settled along the north banks of Salt River, near the present site of Phoenix, and dug the Griffin and the Swilling ditches, the latter having its head about 6 miles east of Phoenix, and near the present dam of the Maricopa and Salt River Valley canals. These first canals were community property, each farmer owning one or more shares and working out his assessments for maintenance. But it was found that a few failed to perform their proportion of the work, which increased the burdens of the others, and so it was decided a few years later to incorporate, and thus put every stockholder on even footing. The Swilling ditch had been enlarged and extended, one branch running to the northwest and watering the land north of Phoenix, while the other flowed due west through the town and covered the lands toward the river.

The Maricopa Canal Company and the Salt River Valley Canal Company were incorporated in 1875 by the stockholders in the Swilling Canal, who transferred their appropriations in the latter ditch to the new companies and received in lieu thereof stock in these companies. The Maricopa Company succeeded to the north branch of the Swilling ditch and the Salt River Valley Company to the south branch. These canals were enlarged and extended until they reached very nearly to the Agua

Fria River. They have continued to maintain a joint dam and head as a matter of economy.

A few years later the Grand Canal was built, heading some miles above the other dam, and reclaiming a strip of the desert lying above the Maricopa Canal. In 1886 the Arizona Canal was completed. It has its head in Salt River, 28 miles above Phoenix, at the eastern base of the McDowell Butte, and flows westerly and northwesterly along the base of the mountains, forming the northern borders of the valley, for a distance of 45 miles to the Agua Fria River, which is the western boundary of the irrigated valley.

Shortly after the completion of the Arizona Canal the Arizona Improvement Company was organized by eastern and western capitalists, and a controlling interest bought in the four canals, viz, the Arizona, Grand, Maricopa, and Salt River Valley, and the general management of the entire system was brought under one head, although each corporation remained independent and distinct. The Arizona Improvement Company was succeeded in 1899 by the Arizona Water Company, which now dominates the four canals watering the north side, William B. Cleary being the general manager of the system.

This consolidation of conflicting interests has proved a great benefit to the entire valley, as it permitted a more economical distribution of the water, and during the severe drought of the past four years prevented any section of the valley being wholly deprived of water.

The valley on the north side spreads to the west like an open fan, the terminus of the Arizona Canal being almost 20 miles north of Salt River, and it contains about 150,000 acres of irrigable land. The four canals named traverse it in parallel lines on successive levels, rendering the irrigation of the land easy and economical.

The water is delivered from the main canals to the lands to be served through lateral ditches flowing south and west along the section lines, the declivity being toward the river and just sufficient for thorough irrigation. It is doubtful if another irrigated valley of equal extent can be found in the world with so smooth and uniform a surface, and yet possessing a general slope that furnishes perfect drainage and reduces to a minimum the cost of distributing and applying the water to the land. On but a few sections in the entire valley has it been found necessary to employ a leveler. All that is required are low borders or ridges thrown up 30 to 50 feet apart across the field and the water turned on at the upper side. The irrigator may then sit in the shade and literally irrigate by the clock. This method of flooding the fields is employed for grain and alfalfa, but in the vineyard and orchard trenches are usually dug between the rows and the water permitted to flow through until the soil is thoroughly saturated.

The method of irrigating orchards that has proven most satisfactory is by a series of deep and wide trenches between the rows of trees, with gates at each end, so arranged as to impound the water when the ditches are filled and hold it until it has been taken up by the soil. The surface of the ground is covered with a growth of native grasses, or by a light layer of straw, which protects the earth from the heat of the sun and retains the moisture which rises from the subirrigation, and thus prevents the soil from baking. No cultivation is necessary where this system is practiced, and the results obtained are most satisfactory, both in the growth of the trees and the yield of the fruit.

In many orange groves sour clover is sown broadcast and permitted to grow and mature on the ground, and the dead grass remains year after year as a protection from the sun and a fertilizer to the soil. Where this method is pursued the ground is flooded when irrigated, the water flowing under the carpet of grass.

The present system of distributing and applying the water to the land is primitive and not economical. Water is bought by the year by the miner's inch, and must be taken by the farmer in regular turn, whether needed or not, as a shortage may occur at any time, when but little water for irrigation can be secured. Hence, during the rainy season, water is frequently poured on the land to its detriment, and much water is permitted to waste in the public highways.

The canal companies on the north side have in contemplation a radical change in the method of distribution of the water, which will probably be put in operation when the storage reservoir is completed, and the supply of water rendered more uniform. Their water-right deeds all contain a provision for the delivering of water by the hour for a given sum per cubic-foot flow per second. By this system the farmer will pay for what he gets and only as he needs it, and naturally will practice the strictest economy. It is conservatively estimated that water will perform fully 25 per cent more service under this system than under the present method.

That the normal supply of water is made to perform the service that is required of it under present methods is due to the intelligent and systematic management of the canal systems, and is highly complimentary to those in charge of this industry.

When it is remembered that the aggregate length of the four canals is 100 miles, and that there are more than 400 miles of lateral ditches used in the distribution of the water each week, some idea of the magnitude of the undertaking may be gained.

Under all the canals of the Salt River Valley water is sold and delivered only to those owning or possessing water rights or shares of capital stock in the particular canal serving the lands sought to be irrigated.

SOUTH SIDE CANALS.

Lying along the south bank of Salt River, and extending some 25 miles above Phoenix, is a valley somewhat less in extent than that described on the north side and possessing many of the same characteristics. Five separate canal systems supply the lands with water, the method of distribution being practically the same as that already described.

The canals on the south side, in order downstream, are: The Highland, Consolidated (including the Mesa), Utah, Tempe, and San Francisco. Of these the Tempe is the oldest, having been first operated in 1871. The Utah is next in priority, followed by the Mesa. These are cooperative companies of water users. The Highland is incorporated; the San Francisco is a private ditch, owned by the Bartlett-Heard Company. The Consolidated Canal Company was organized for the purpose of enlarging and extending the Mesa canal system, and to supply lands lying to the east and south of Mesa City. That this work might be successfully and harmoniously carried on, the Mesa Canal was leased, and the entire consolidated system is managed by the new company through Dr. A. J. Chandler. These canal systems supply water to the country surrounding the towns of Tempe, Mesa, and Lehi.

Experience has demonstrated the advantages of rotation of water in the seasons of scarcity, and all the canals of the valley have adopted this system.

During the summer time, when the flow of the river is greatly reduced, instead of attempting to deliver to each farmer the few inches of water that he is entitled to continuously, a good irrigating head is run to him for a shorter time at regular intervals. This is much more satisfactory to the farmer, and effects a great saving in water, when every drop is precious.

There have been many disputes in the valley over the appropriations and distribution of water, as in all other irrigating countries, resulting in much litigation in the past. The rights of the various canals were determined by Judge Kibbey in 1890, and a water commissioner appointed to distribute the water daily to the various canal systems. This method is still in vogue, and has been satisfactory to the canal companies, and beneficial to the community, as justice is meted out to all alike, and in extreme low water each canal gets its proportion. It has prevented much vexatious and expensive litigation also.

The nine canals mentioned as watering the lands of this famed Salt River Valley, comprise one of the largest and most successful irrigation systems in the world. It is doubtful if the world can produce another of equal extent where so many favorable conditions are combined. In fact, there has been but one drawback, and that will soon be removed by the construction of the Tonto Storage Reservoir. At present the flood waters of the Salt River flow down to the sea and are lost. For two or three months each summer the normal flow of the river is not sufficient to supply water to all the lands needing it, and summer crops often fail in consequence.

Now that the flood waters are to be impounded, and reserved until needed in the valleys below, conditions will be as nearly ideal in the Salt River Valley as man may ever expect to enjoy on earth. The watershed supplying our canals is ample to produce all the water necessary during any ordinary year, being about 13,000 square miles, much of the territory embraced in it being elevated plateaus and mountain ranges, where abundant snow falls. The waters which rush down the mountain sides to the plains below carry large quantities of fertilizing material, which continually enriches the soil and renders the use of other fertilizers unnecessary, except in rare cases or for some special crops.

A special committee of the United States Senate reported in 1890 of the soil of this valley, that "An analysis shows its fertile qualities to be superior to that of the Nile earth."

And Orange Judd, after a visit to the Salt River Valley, said editorially in the Prairie Farmer: "We have seen thousands of acres of growing crops that rival in luxuriance those found in the famed Valley of the Nile, which derives its vivifying liquid, bearing fertilizing elements, from the far-off lands of upper Egypt. This valley of the Salt River derives its luxuriousness from the mountain ranges of interior Arizona."

The storage reservoir which the United States Government is now constructing on Salt River, 60 miles east of Phoenix, will be one of the largest of its kind in the world.

The Colorado River Valley.—This is one of the most extensive valleys in Arizona, beginning above Needles and running southerly to the Mexican line. There is no greater area of irrigable land in Arizona than that in the Colorado River Valley. With Government assistance assured, the future of this valley is exceptionally promising. Thousands of acres of fertile land will be reclaimed by the diversion of the waters of the Colorado River. This favored section has not been inaptly designated as the valley of the American Nile. and its present growth is a fair indication of future prosperity under favorable conditions.

For the past few years the valley has slowly but steadily been peopled with a persistent, sturdy class of home seekers bent on reclaiming the rich, virgin soil from the mesquite and sagebrush, their efforts resulting in prosperous farms dotting the site of the primal desert growth.

At the present time there are 4,000 acres of land under cultivation, making an increase of 1,000 acres during the past year. There are, however, about 45,000 acres under the various canal systems susceptible of irrigation, and the cultivated area bids fair to largely increase during the coming year.

The principal methods of irrigation are by gravity and pumping, the following named being the canal companies supplying water in the valley: The Colorado River Pumping and Irrigating Company, The Yuma Land and Water Company, and the Irrigation Land and Improvement Company. In addition to the water systems mentioned, a new company, the Colorado Delta Canal Company, has purchased the rights of the Speese canal, and as soon as certain agreements with the landowners under the proposed canal are completed will extend and enlarge the waterway.

The new canal will have its main head at Cocopah Point, about 25 miles above Yuma on the Colorado River. This system will take in the mesa lands and will, when completed, greatly increase the irrigable land.

The Yuma Water and Light Company has in successful operation a pumping plant, which supplies water for the company's fruit ranch on the mesa near Yuma. While the area cultivated by the pumping plant consists of only 80 acres, the company has had great success in raising early citrus fruits. The company this year netted very handsome profits from the sale of oranges, lemons, apricots, grape fruit, and vegetables, supplying the markets of Arizona and California from two to four weeks earlier than the southern California fruit belt.

The soil of the mesa lands is especially adapted to raising citrus fruits, the valley soil being best adapted for deciduous fruits.

The valley soil is a sandy-loam deposit and has a uniform depth of 7 feet. Water can be obtained at almost any point in the lowlands at a depth of 12 feet.

The products of the valley are dates, almonds, walnuts, strawberries, raspberries, blackberries, gooseberries, grapes (all varieties), pears, peaches, apricots, figs, oranges, lemons, and pomegranates. Of cereals and grasses may be mentioned sugar and Kaffir corn, barley, clover, maize, sorghum, timothy, blue grass, and alfalfa. From six to seven cuttings of alfalfa can be obtained during a favorable year, averaging a fraction over 1 ton per acre each cutting.

It has been demonstrated that all fruits indigenous to the tropical or semitropical regions can be grown in this valley. Experiments have been successfully made with cotton, but owing to the cost of labor has not passed beyond the experimental stage. In the lowlands the sugar beet has been tested and found to contain a high percentage of saccharine matter. The raising of the sugar beet will no doubt be one of the future industries of the valley.

The population of the valley, exclusive of Yuma, is about 1,200 and is steadily increasing. As an evidence of the growth of the population it may be mentioned that there are now six schools in the valley, whereas there was but one three years ago.

One of the principal drawbacks to the rapid settlement and development of the valley, and a potent one, is that in the spring months during high water in the Colorado River much of the land of the valley is subject to overflow, thereby rendering otherwise very valuable land practically useless for cultivation. This condition of affairs can not be materially bettered until the Government comes to the assistance of the settlers by building a levee to the Mexican line.

The selection by the honorable Secretary of the Interior of the Colorado River project for the reclamation of the arid lands lying along that stream is pointed to as another step toward bringing Arizona out of the desert wilderness and making her valleys blossom in productiveness.

The Yuma project is now in the hands of the Yuma County Water Users' Association, and I am informed by Mr. M. Winsor, president of that association, that sufficient signers have been enlisted to insure the success so earnestly desired. With the requirements of the Government complied with the ranchers may look for the boon which means so much to them and their section of the Territory, for there can be no doubt but that the Yuma project is recognized as one of the most feasible in the arid west.

Mr. Winsor informs me that it is the purpose of the water users' association to secure the irrigation of every acre of land embraced in the Yuma project, as outlined by the engineers of the Reclamation Service. The high expense per acre of the Yuma project, and the productiveness of the soil, necessitates the application of greater labor and time in farming than in colder countries with short seasons. This will have the effect of causing farmers to sell parts of their holdings and thus make more farms. Mr. Winsor predicts that under storage conditions the average size of a farm in the lower Colorado River Valley will not be more than 40 acres.

In addition to the Yuma project, or rather supplementary thereto, the engineers of the U. S. Geological Survey are now working upon plans to irrigate 10,000 acres of mesa land east of Yuma. The water will be pumped by power generated at the falls to be created by the consummation of the larger proposition on the Colorado River. A steam pumping plant is proposed for use when the other power is required for other purposes.

Santa Cruz Valley.—Great irrigation possibilities are presented in this valley, and I believe there is a field for research by the Geological Survey there promising rich returns. The development of the underground water supply would, in my judgment, give an abundance of water for the thousands of acres of fertile lands in that valley. I am

pleased to observe that the attention of the Geological Survey has been turned to the Santa Cruz and San Pedro valleys during the latter part of the year.

The Santa Cruz is one of the most extensive valleys in Arizona, and agriculture is carried on to a considerable extent. The watershed is composed of mesa and mountains, the latter rising to a height of 7,000 feet. The river supplies water for irrigation purposes throughout the year, but during the dry season the supply is, of course, very small and inadequate. There is, however, a subcurrent of water capable of supplying sufficient flows for irrigation purposes if carried on on a small scale.

The Middle Gila and Casa Grande valleys.—The construction of the San Carlos dam is the ultimate salvation of this section of the Territory, where the water supply for several years has been an almost complete failure. There are thousands of acres of irrigable lands which could be made profitable in agriculture and stock raising.

Under the Casa Grande Canal there are 25,000 acres of land claiming water rights, scarcely one-fifth of which is enjoying water at the present time from this canal. Many farmers have been compelled to give up their lands and seek other fields, where the profits in agriculture and stock raising were more secure.

Stretching from Florence south there is a vast area of irrigable land which would be brought under cultivation by the construction of the San Carlos dam. This project has received considerable attention from the Geological Survey, and it is one deserving of further investigation.

Kanab Valley.—Fredonia is the center of population and agricultural activity in Kanab Valley. The town is situated about 3½ miles south of the Utah line, and about 7 miles from Kanab. There are about 25 families located here, all engaged in agriculture and horticulture.

Water for irrigation purposes is taken from Kanab Creek, one-half mile north of Fredonia. During the months of June, July, and August the supply is limited, and during these months water is most needed by the farmers. There are about 300 acres of land under cultivation, alfalfa being the principal crop. There are thousands of acres of fertile land that might be brought under cultivation by means of water storage, as during the winter months water sufficient to irrigate vast areas goes to waste.

All kinds of small grains are raised in this valley, and fruit grows successfully. Apples are a sure crop, and peaches, although damaged by frosts during the past two years, are usually profitable and successfully raised.

Stock raising is carried on in a profitable manner. This valley is regarded as an excellent place for stock, although of late years the ranges have been overgrazed by sheep and cattle from Utah. However, since the reserve was created the valley is not overrun with large herds of sheep from across the line, and the prospects are bright for this section of the Territory.

The Buckeye.—The Buckeye country is located about 25 to 50 miles southwest of Phoenix, along the north side of the Gila River, and is irrigated by the Buckeye Canal, which is taken out of the Gila River about a mile below the mouth of the Agua Fria, and about 6 or 7 miles below the mouth of the Salt River, thus getting the underflow from all these rivers.

The dam is made of rock blasted from a granite mountain nearby and hauled to the dam on cars. This dam has been greatly improved by the present owners of the canal by the expenditure of a large sum of money in strengthening and widening the dam, so it is really a riffle in the river in the time of high water.

The canal is about 22½ miles long, and will carry about 8,000 miner's inches below the wash gates.

The amount of water at the low season of the year seldom, if ever, gets below 4,000 inches at the dam. This condition only exists about two to two and one-half months, until the water in the Gila and Agua Fria rivers rises, and then there is an absolute abundance of water for all users.

There are 17,000 acres of land under this canal, but only about 11,000 to 12,000 acres are actually under cultivation. The soil varies in different parts of the valley, and is very correctly described by the soil map issued by the United States Government. Alfalfa is the main crop raised, and as there is an abundant supply of water at all times this crop grows to perfection. Most ranchers cut the first crop, and some the second, and pasture the remainder of the year.

The valley has an excellently equipped telephone system which reaches nearly every ranch under the canal. There is also a stamp mill located at the town of Buckeye which handles ore from the mines in the southern part of the White Tank Mountains, where there are some splendid prospects.

There are four schoolhouses located in the valley; one church has been built, and one is in course of construction, and church services are held in two of the schoolhouses. The greatest need in this section is railroad facilities.

The improvement in this particular section of Arizona has been very rapid during the past three years, and it is at present one of the richest and most fertile sections in the West.

Arlington Valley.—The Arlington Valley lies about 50 miles west of Phoenix, on the north side of the Gila River. It embraces about 5,000 acres of fine farming land, 3,000 acres of which are now under cultivation, the most of it being devoted to raising alfalfa. Cattle feeding and the production of alfalfa for the market are the chief industries in this valley.

The Arlington Valley receives its water supply for irrigation from the Gila River, the water being carried to the lands by means of a canal known as the Arlington Canal; this canal being 15 miles in length and its carrying capacity 3,000 miner's inches of water. The canal is owned and operated by the owners of the land in the Arlington Valley. The cost of water delivered to the land is $1.25 per acre. This price will be decreased when the canal shall have been placed in first-class condition.

About $1,300 was expended in placing a syphon across the Hassayampa River. The syphon is now delivering water with perfect satisfaction to the company. The syphon is made of redwood lumber and is 300 feet in length and 4 by 6 feet in the clear, the bottom of the syphon being 8 feet below the surface of the river.

The San Pedro Valley.—The San Pedro Valley begins near the Mexican line and extends in a northerly direction until it meets the Gila Valley in Pinal County. Agriculture is carried on in the San Pedro Valley extensively, and the valley is thickly settled. Alfalfa is

raised for cattle feeding and other pasture purposes, and considerable barley and wheat are produced. There are many substantial ranches throughout the valley. This valley, though unusually narrow, is extremely rich and fertile and has two sources of irrigation, i. e., the San Pedro River and artesian wells. It created and supports the towns of St. David and San Marcos, and furnishes Fairbank, Tombstone, Bisbee, Naco, and Douglas with a great proportion of the hay and grain and vegetables used. Fort Huachuca is also a heavy consumer of the products raised. The fertile lands will average from half a mile to a mile in width, and already there are at least 5,000 acres under cultivation, with such acreage increasing greatly yearly. Ditches from the river are used in irrigating the bulk of the land, but artesian wells play an important part especially from the north end of the Boquillas land grant, near St. David, to Benson. There is no doubt that the artesian flow exists throughout the valley, as wells were recently sunk successfully beyond the south end of the Boquillas grant. Artesian water is struck at an average of 400 or 500 feet, but at that depth the flow is not strong, usually 1 to 2 inch pipe being used. Those depending on artesian water construct earth reservoirs, the soil readily holding the water almost as securely as cement tanks.

At points along the river, notably at and near Charleston, nature has assisted in making fine reservoir sites. Sufficient water could be impounded there at a minimum expense to irrigate all the land not now under cultivation as far north as Benson, twenty-odd miles away. Owing to the fact that the mining towns above mentioned are almost contiguous to this valley, every pound of produce raised sells at the highest market rates for cash. In the way of vegetables almost every variety is grown with success. Potatoes and beans are particularly fine and choice. Melons, both water and musk, are raised in profusion, and they are extra high grade, sound and delicious in flavor. Strawberries are also raised to a limited extent, and what are marketed can not be excelled in quality. Very little has been accomplished in the way of planting fruit and nut trees, but a start has been made and the indications are that certain varieties will thrive exceedingly well and insure regular crops. The San Pedro Valley in altitude is probably as high, if not higher, than any other valley in southern Arizona, and untimely frosts do not seem to be as severe or persistent as in those of a lower range. The bed of the river being ordinarily deep in comparison with the width, the water therein seldom causes any serious damage by leaping its bounds. Disastrous overflows are unknown and never calculated upon by the farmers.

Valley of the Little Colorado.—In and around St. Johns the farmers have always had to contend against the numerous mineral springs which are scattered along the banks of the Little Colorado River for 15 miles above St. Johns. These mineral springs are in many respects remarkable, and the volume of water discharged from them is so great and the water is so strongly impregnated with mineral that the Little Colorado River partakes of the nature of these springs most all the year round. It is only during the rainy season and when the snow melts in the mountains in the spring and we have fresh-water floods that there is any perceptible change in the character of the water that reaches St. Johns for irrigation purposes. During the past six to ten years the snowfall in the mountains in the winter and the rainfall in

the summer has been so light that they were insufficient to counteract the evil effect of the water from these springs upon cereal vegetation.

To give you an idea of the capacity or extent of these springs the smaller of them are about 10 feet in diameter at the surface and 50 to 60 feet deep. The larger springs are more than 20 feet in diameter at the surface and have never been fathomed. Stockmen living in the vicinity of these springs have tied two and three 60-foot lariat ropes together and sounded them 150 to 180 feet without finding bottom. The flow from the springs is the same all the year round and the largest would fill a good-sized mill race.

There are about a dozen of these springs emptying into the Little Colorado River within 15 miles above St. Johns, and they are so strongly impregnated with mineral that it renders the land useless for raising any of the cereals. Alfalfa has withstood the baneful effects of this mineral water for twenty years, but the farmers say that the water is beginning to tell upon their alfalfa, killing it out in places and greatly reducing the crop in tonnage as compared with former years, when heavy snowfall prevailed in the mountains in the winter and a good rainy season set in in the summer.

In and around Springerville, situated about 30 miles south of St. Johns, at the foot of the White Mountains, is the garden spot of Apache County. They have no mineral springs to contend with, all their water being pure mountain and rain water, but owing to adverse climatic conditions agriculture in this section has been almost a total failure for the past ten years. In former years when we had good seasons there would be about 5,000 acres of land under cultivation in and around Springerville, producing the finest crops of wheat, barley, and oats, the farmers having a large surplus to sell. This year there are not 1,500 acres planted in the whole section.

The acreage of farming land in Apache County is about 6,500 acres.

The crops produced are wheat, barley, oats, corn, and alfalfa, the only reliable crop for the last ten years being alfalfa; the most precarious and uncertain being corn, on account of the early frosts in the fall.

The water supply, if we are ever so fortunate as to get our reservoirs filled, is five times in excess of our necessities. There are six reservoirs in the White Mountains above Springerville, four of which are natural, the water being run into natural basins from the river; the other two are made by damming the river. The irrigation capacity of the six reservoirs is 6,000 acres.

There are three reservoirs between Springerville and St. Johns, two of them natural, with a capacity of 1,500 acres, and one artificial, made by damming the river, with a capacity of 17,000 acres.

There are two reservoirs below St. Johns, one natural, with an irrigation capacity of 1,000 acres, and one artificial with an irrigation capacity of 8,000 acres.

The total capacity of Apache County reservoirs is 33,500 acres, yet, owing to unfavorable conditions prevalent for the last ten years, 90 per cent of the farmers of this county have had to buy their flour and seed grain every year.

IN NAVAJO COUNTY.

The Little Colorado River, with its source 125 miles to the southeast, in the Mogollon Mountain range, flows from east to west through the

county near its center and is replenished by numerous streams, the principal ones in the county being Silver Creek and the Show Low. The many irrigated districts along their banks in this and adjoining counties attest to the wonderful productiveness of its soil wherever water has been systematically applied, changing the desert into many self-supporting happy homes.

Entering the county from the west via the Santa Fe Railway, within 3 miles of the western boundary, is the thriving railroad town of Winslow, where an irrigation system has been constructed in recent years whereby 520 acres have been redeemed to agriculture, producing tons of forage and cereals, the accomplishment of which a few years ago was considered incredible.

St. Joseph, 20 miles east of Winslow, was one of the first settled and irrigated districts of the county. One mile south of the present location is the old "Fort," so called because the houses built of stone formed a square opening out on to a plaza, the fourth being on a lake of water. By this means the early settlers had protection from the prowling, murderous Apaches and Navahos, who had little sympathy with the white invader. The St. Joseph of to-day has well-shaded streets, handsome brick and frame residences surrounded by gardens of flowers and vegetables, and 800 acres of alfalfa, wheat, and cereals, while its acres of luscious melons would delight the appetite of an epicure, and it is still expanding. More than 100 acres of virgin soil have thisy ear been turned by the plowshare, and is now returning more than its hundredfold to the industrious husbandman. The system consists of two reservoirs, created by the erection of dams in the Little Colorado River, from which 17 miles of canals conduct the water to the soil. There is in contemplation the building of a reservoir for the catchment of the flood waters, which will very largely increase the present supply and add 500 to 700 acres to the area now under cultivation.

All this was accomplished by the indomitable energy of one man, who enlisted a few of his neighbors and almost alone started the work of erecting a dam on Clear Creek, 9 miles from the land he wished to supply. Many believed it to be a waste of time, money, and energy, but so successful has been the venture that others have become interested and they have constructed a reservoir on the Chevelon, and built a canal 18 miles long which, combined with the former, has increased the water supply to such an extent that the near future will see the Winslow system one of the largest in northern Arizona.

St. Joseph, 20 miles east of Winslow, was one of the first settled and irrigated districts of the county. One mile south of the present location is the "old fort," so-called, because the houses built of stone formed a square opening out on a plaza, the fort being on a lake of water. By this means the early settlers had protection from the prowling, murderous Apache and Navajo, who had little sympathy with the white invader. The St. Joseph of to-day has well-shaded streets, handsome brick and frame residences, surrounded by gardens of flowers, vegetables, and acres of alfalfa and wheat.

The undercurrent throughout the valley is abundant at easy depths and has been utilized by some of the settlers in beautifying their residence grounds to such extent as to demonstrate what a more general and extensive system would accomplish. Being situated similarly to, and in some respects more favorably than, other successfully irrigated

districts in the county, is additional evidence of the claim made that abundant success would follow the development of Holbrook's latent resources.

Woodruff, 12 miles southeast from Holbrook, is peculiarly situated on the Little Colorado River at a break on the east side of a canyon which begins near Snowflake, 30 miles distant, whereby an opening of 1,500 acres of valley land intervenes to the south and east of Woodruff Butte, a landmark of the country that can be seen for many miles from all directions.

Over 1,000 acres are now producing the usual crops of this locality, with orchards, gardens, flowers, and neat comfortable homes everywhere abounding as a reward for the perseverance of their owners, who have constructed the reservoir and 9 miles of canal and laterals which conduct the water to their arid lands.

The Snowflake and Taylor irrigation system is the most extensive and complete in the county, partly on account of its being so highly favored by nature in area, and on account of its water supply. The source of the water supply is Silver Creek and Show Low, two streams rising in the high altitudes of the White Mountains and fed by its thousands of springs.

Land is cultivated to the extent of about 2,000 acres, with a like amount that is annually tilled as "dry" farming, the snows of winter and the rains of summer affording sufficient moisture to grow all the hardy cereals and root crops, especially potatoes and cabbage, which can not be excelled. The great need of this section is transportation. The best information to be gained places the area of "dry" farming in the mountain region in the south end of the county at 3,300 acres.

The Gila Valley.—The Gila Valley extends from the Gila Canyon, near the junction of the San Pedro River, westerly to the east bank of the Colorado, a distance slightly exceeding 250 miles. That portion of it situated in the county of Yuma, known as the Lower Gila Valley, is about 100 miles long and from 2 to 10 miles wide, all of which is susceptible of profitable cultivation. The river from which it takes its name cuts the valley in two. Its watershed extends some 30 miles north and upward of 50 miles south of its channel, the land from either extreme inclining more or less rapidly toward the stream. The Gila traverses a marvelously fertile country, very great in extent, and splendidly adapted to the cultivation of nearly all the products of the temperate and semitropical zones, besides many of the fruits common in the Tropics. Nor is it longer a matter of idle speculation, for flourishing ranches in many portions of the valley, drawing water from several important canals, amply demonstrate the magnificent results that will ensue should the water supply be rendered permanent, equable, and adequate through appropriate storage systems.

What is commonly known as the "Middle Gila Valley" is located in the central part of Graham County, at an elevation of about 3,000 feet above sea level. It is something like 40 miles long and will average probably 10 miles in width. Owing, however, to the lack of a requisite water supply, the area now under cultivation will not exceed an average of 2 miles in width by 40 miles in length.

The land is, generally speaking, a rich sandy loam, some of it, however, being mixed with more or less clay, which, under the almost magic touch of the industrious husbandman, becomes very productive,

land which has been cultivated for more than twenty years yielding as abundantly to-day as in the beginning, and that, too, without the application of any fertilizer other than the sediment of the Gila River, which is washed out upon the land during high water, making it as rich and productive as the lands built up by the overflow of the historic Nile.

The above-named Gila River is the chief source of our water supply. It is a perpetual stream, impossible to drain for the reason that very much of its flow is underground and, owing to the long continued irrigation of the adjacent lands, a large amount of water is constantly seeping into the channel from either side, and, as a result of these conditions, a few rods below a tight dam will be found a good running stream, some of the lower canals furnishing a larger and much more regular supply of water than those heading higher up the river.

There are now probably 28 canals conveying water from the Gila River to the lands in this valley and irrigating approximately 50,000 acres, for which they furnish an abundance of water for ten months in the year, a shortage sometimes occurring during parts of May, June, and July. These canals vary in size from 3 to 12 feet in width and from 2 to 15 miles in length, and are all owned and operated by farmers to whose lands the water is conveyed.

The principal crops of the Gila Valley are wheat, barley, and alfalfa, about 15,000 acres being devoted to each of the above-named products. Wheat is planted at any time between October and March and with from three to five irrigations can be harvested early in June, yielding about 35 bushels to the acre, and this finds a ready market at from $1.25 to $1.75 per hundred pounds. The planting season for barley is practically the same as wheat; it will, however, mature ten days to two weeks earlier, and therefore requires one irrigation less and makes an average yield of 45 bushels to the acre, selling readily at from $1 to $1.50 per hundred pounds.

Alfalfa is cut four and five times a year, and will probably average six tons to the acre each season, in addition to furnishing good pasture for stock during the winter months. It requires at least one good irrigation each time it is cut, and on some of the land even more than that. The thousands of tons of alfalfa grown in the valley find a ready market at from $6 to $10 per ton in the surrounding mining camps of Clifton, Morenci, Globe, Bisbee, and others.

Corn does well, yielding from 50 to 60 bushels to the acre, the small amount planted being accounted for from the fact that June is the best month in which to plant corn; and it being the driest month in the year, it is difficult to secure sufficient water to keep the other crops growing and at the same time water any great amount of corn land; but whenever water can be secured, a good crop of corn, cane, or beans can be readily grown upon the same land that has already produced a crop of wheat or barley.

The two-crop system does not seem to injure the land, for every year during the summer rains the river water carries large quantities of fertilizing materials which seemingly keep the land continually renewed, and should the ground show signs of wearing out in consequence of continual cropping, it can be entirely renewed in a very few years' time by planting it to alfalfa.

The fruit-growing industry is just in its infancy, very little having yet been attempted in that direction. Enough, however, has been

done to establish the fact that apples, peaches, apricots, plums, and grapes of a very fine quality can be profitably grown for the market, there now being some few such orchards and vineyards on a good paying basis.

Experiments have been made in sugar-beet culture which have resulted most satisfactory, showing that the soil is well adapted to their growth, both as to an abundant yield and richness in saccharine matter.

There are in the Gila Valley approximately 100,000 acres of uncultivated land which would be nearly or quite as productive, could it be reclaimed, as any now being cultivated; this, however, can only be accomplished by the conservation of the flood waters which are now permitted to rush on unchecked to the ocean or by more fully developing the artesian water possibilities of the valley, either of which can be readily accomplished through governmental aid or the interesting of sufficient outside capital.

While it is quite generally believed that artesian water can be secured in any part of the valley, if sufficient depth be reached, still the fact remains that all the wells so far developed are confined to what is locally known as the artesian district, comprising a strip of country probably averaging 2 miles wide and 20 miles long and lying on the south side of the valley near the foothills of the Graham Mountains. There are now in this district about forty flowing wells. Most of them are small and without casing, and as nearly as can be determined, they have an average flow of about 75 gallons per minute; some few of the best, however, yielding more than double that amount.

The land is productive, and there seems to be no injurious effect to vegetation from the use of the well water. The average depth of the present wells is about 600 feet, the deepest one being something over 1,000 feet. In a few instances the volume of water has diminished since the wells were sunk; this, however, is attributed to the fact that such wells are not cased and are continually caving in more or less, the few wells that are cased the entire depth never having failed in the least.

The principal towns are Solomonsville, the county seat; Safford, Thatcher, Central, Pima, Eden, and Fort Thomas, all of which are thriving, prosperous, farming towns. The business blocks, residences, and farmhouses are, generally speaking, commodious, substantial buildings constructed of well-burned brick.

Duncan.—The Gila River rises in southwestern New Mexico, and has a generally southwesterly direction until it crosses the Territorial line into Arizona at about 32° 40′ north latitude. Its principal sources of supply are from the Black Range on the east and from a number of ranges on the west, including Little Range, Mogollon Range, and Diablo Range. The average elevation of these mountain peaks is from 9,000 to 10,000 feet. The general character of the country is a high and rolling plateau, with the river flowing through it in a deep canyon, and with practically no agricultural lands within its area. The river emerges from its upper canyon about 10 miles before it reaches the Arizona line, and thence flows through a valley of considerable width, known as Duncan Valley, until just before it receives the waters of San Francisco River. In Duncan Valley a number of ditches divert water for irrigation purposes. San Francisco River, the principal tributary of the upper Gila, has its source in the north-

east corner of Graham County, Ariz., but 15 miles below it passes into New Mexico. Its general course is thence southerly, returning into Arizona at about 33° north latitude. The area drained is high and mountainous, the principal ranges being the San Francisco, the Tularosa, and the western slope of the Mogollon, with elevations ranging from 8,000 to 10,000 feet. The course of the river through this portion is characterized by a succession of canyons alternating with valley-like openings, with a fall of about 35 to 40 feet per mile.

Kirkland Valley.—This valley contains about 2,000 acres of irrigable land, a very small portion of which is now under cultivation owing to the scarcity of water. During years of plentiful rains the entire area of the valley can be brought under cultivation and crops raised. Alfalfa hay, and Sacaton hay and barley are raised. Fruits are also cultivated with great success. It is said that the finest pears produced in the Southwest come from the Kirkland Valley, and it is a matter of regret that but a small number of orchards exist there. This valley is in Yavapai County and has the advantages of railroad facilities. Kirkland Creek traverses this valley.

Thompson Valley.—This is a small valley of 700 acres or more, something over 200 acres being under cultivation at present. Fruits are raised and agriculture is carried on successfully. Being located close to the mines in the mountains good prices are obtained and a ready market afforded for all produce.

Peeples Valley.—With an extensive area of rich land this valley is one of the most important in Yavapai County. There are in the neighborhood of 3,000 acres of land that can be irrigated, and fully half of it is cultivated almost every year. The valley is famous for the corn produced, and beans are also grown with success. Alfalfa provides pasture for cattle and other stock, besides being a commodity for the market in the shape of hay.

Skull Valley.—There are about 700 acres of land in this valley susceptible of cultivation, and many prosperous ranches exist. Hay and grain are produced and some fruits are raised. Settlers depend upon the rains and melted snows to provide water for the crops, and no irrigation by means of diverting water from running streams is carried on. Excellent apples, peaches, and pears are raised.

Williamson Valley.—There are perhaps 5,000 acres of land in this valley. During favorable seasons crops of potatoes, corn, and other vegetables are raised. The most of the settlers are engaged in stock raising, and the principal use to which the land is put is the pasturing of stock. This valley is in Yavapai County.

Rillito Valley.—Located north of Tucson, in Pima County, the Rillito Valley produces vegetables, fruits, hay, and grain, and other products for the Tucson market. Excellent strawberries are produced there, and the watermelon and muskmelon are unsurpassed. It is a narrow valley skirting the foothills of the Catalina Mountains and extends for many miles. There are many substantial homes there, and each year adds to the acreage under cultivation.

Sulphur Springs.—Agriculture is practiced but little in the Sulphur Springs Valley in Cochise County. In the lower portion of the valley near the Mexican line some small ranching is done, and many of the cattle ranches contain small areas of cultivated lands. There are some excellent water-storage sites along this valley which would bring large areas under cultivation should the sites ever become utilized.

Walnut Grove.—The Walnut Grove Valley in Yavapai County contains rich soil which is utilized by the ranchers in that section to some extent. Gardening and fruit raising is carried on there, and small patches of alfalfa and grain cultivated.

Verdé.—The Verde Valley in Yavapai County is a rich agricultural section, but owing to the small quantity of water obtainable but little land is cultivated. Hay and grain are raised for the Jerome and other markets and bring good prices. Fruits and vegetables are also cultivated with success.

Cibola.—Cibola Valley, so called after the name of the Zuñi villages of the sixteenth century, contains 25,000 acres of as fertile irrigable land as there is under the sun; 5,000 acres susceptible to annual overflow from the silt laden Colorado and 5,000 acres too high to be irrigated, making 35,000 acres in all, the major portion of which is now beginning to blossom as a rose.

A colony of California agriculturists have recently become interested in the Cibola Valley, and have commenced the work of building homes there. They have planted beet fields, orchard groves, vineyards, and orchards of deciduous fruits.

This land lies, as the crow flies, 50 miles north of Yuma, 86 miles by river or wagon road, on the Arizona side, and 60 miles by the more direct route to Picacho, on the California side, and from thence on the Arizona side to the valley. The land is fertile beyond comparison with any but the land of the Colorado River, and will bountifully yield any crops suited to the climate of Yuma County, including all of those of the South Temperate Zone and many of those of the semitropic belt. For agricultural purposes the section is unsurpassed, for the cereal and hay crops, wheat, oats, barley, corn, sorghum, alfalfa, etc., are here in their element.

The Cibola Canal is 16 miles in length, 12 feet wide at the bottom, and 4 feet in depth after it gets out on the land. A heading has been secured where quicksand does not trouble, and one of the greatest obstacles to taking out gravity canals from the Colorado is avoided. The head gate has already stood the test of the high water.

The climate of the Cibola Valley is all that can be said of the section immediately surrounding Yuma. The dryness of the atmosphere renders sunstroke unheard of. Small game is in abundance, while the lagunas during the cooler months teem with ducks and geese, and the hills adjacent contain deer and mountain sheep.

FOREST RESERVES.

During the past year no forest reserves were created. The San Francisco Forest Reserve, created August 17, 1898, was enlarged by Executive order of April 12, 1902, so as to cover the sections owned by the Santa Fe Pacific Railroad Company, successors to the Atlantic-Pacific Railroad. The Black Mesa Forest Reserve was created August 17, 1898; the Prescott Forest Reserve was created May 10, 1898, and enlarged October 21, 1899; the Santa Rita Forest Reserve was created by Executive order of April 11, 1902, and is situated south and southeast of Tucson; the Santa Catalina Forest Reserve, created by Executive order of July 2, 1902, is situated northeast of Tucson; Mount Graham Forest Reserve, created by Executive order of July 22, 1902, is situated northeast and south of Camp Grant Military Reservation;

Chiricahua Forest Reservation, created by Executive order of July 30, 1902, is situated east of Tombstone, in Cochise County, and extends about 10 to 15 miles from the New Mexico boundary; Grand Canyon Forest Reserve was created by Executive order of February 20, 1893.

Four sections of land southeast of Tucson, in Pima County, were reserved during 1902 for an agricultural experimental station, and the director of the agricultural experimental station of Arizona has under way upon this land experimentations in the improvement of the ranges.

LABOR SUPPLY.

There have been no strikes or labor disturbances of any note during the year. The prompt action of the authorities in quelling the Morenci riots of the previous year, and the swift punishment of the strike leaders and rioters, has served as a beneficial lesson to that class who combine with a demand for higher wages riotous actions.

There are thousands of miners employed at skilled labor in this Territory, the wage rate being from $3 to $5 per day. The demand for miners is always fair, owing to the constant development of new mines in the Territory. The character of the laboring men is generally of a high order and they are in the main substantial citizens interested in the material welfare of the Territory.

Labor in most branches is organized throughout the Territory. The trade unions are conducted on a liberal policy of giving the most skilled workmanship for the hours employed, demanding only what is fair and just, and striving at all times to better the condition of the laboring men.

Eight hours is the legal period of employment in the Territory in underground work.

The construction of the Tonto dam has given employment to over 1,000 men, and the force there is increased as the work progresses. The laborers are for the most part skilled, although a great many common laborers are employed. The construction of the Yuma irrigation project will also be under way during the coming year and the demand for laborers will increase through this agency.

RAILWAYS AND TRANSPORTATION FACILITIES.

There has been more than usual activity in railway circles during the past year. The development of new mines has served as an impetus, demanding transportation facilities. The Arizona Southern has come into active existence during the year. The total length of this line is about 22 miles, the most of the construction having been completed at the close of the fiscal year. The road runs from Red Rock, on the Southern Pacific Railway, to the Silverbell mines.

The Bradshaw Mountain Railway was completed from Mayer to the Crown King mine on June 30, 1904, the total distance being 28 miles. The necessary buildings and other facilities have been provided and the road placed in active operation. This road places a rich mineral section of the Territory in easy access and will result in the development of many mines.

The Phoenix and Eastern Railway was placed in operation on February 1, 1904. The track is now completed to Kelvin in Pinal County, a distance of 81 miles from Phoenix, where the road was started. The

grade has been completed 20 miles farther toward the terminus of the road at Benson on the Southern Pacific.

The grade of the Arizona and California Railway is in progress west of Wickenburg in Maricopa County. It is the intention of the projectors to extend this line to the Colorado River as rapidly as conditions warrant, eventually terminating at a coast point in California.

Both the Bradshaw Mountain and the Phoenix and Eastern railways are owned and operated by the Santa Fe, Prescott and Phoenix Railway Company, whose main line extends from Ash Fork, on the Santa Fe Pacific, to Phoenix.

The Santa Fe, Prescott and Phoenix Company has improved the physical conditions of its property during the year to some extent. In addition to the three new locomotives received by the company in January of this year, the company has purchased three additional ones, which were delivered during the month of June. The company has also made improvements in its passenger equipment. It now has in operation on its lines 17 oil-burning engines. A storage tank for oil, with a capacity of 850,000 gallons, has been erected at Phoenix during the year. Additional roundhouses and shop buildings have been erected at Prescott and many minor improvements made.

The Atchison, Topeka and Santa Fe Railway has made extensive improvements in its property during the past year. This road traverses the Territory from east to west, passing through Apache, Navajo, Coconino, and Mohave counties.

During the past fiscal year the most of the work accomplished has been in replacing wooden bridges with permanent steel structures and laying heavier rails. Ninety-four miles of track have been reconstructed in this manner in Arizona. This improvement was demanded in order to afford proper roadway for the heavier power and equipment necessary to promptly and economically handle the increased traffic. The advent of heavier power has also made necessary large expenditures for additional tools and machinery in order that repairs can be expeditiously handled.

The general increase in traffic has necessarily called for increased water consumption. To meet this the company has expended approximately $75,000 in Arizona during the year. Improvements have also been made in fuel-supply stations by reason of the adoption of oil in lieu of coal as fuel on the line between Seligman and Winslow on freight locomotives. This change required the expenditure of $120,000 for reservoirs and other necessary facilities.

On the Grand Canyon Railway, also operated by the Atchison, Topeka and Santa Fe Railway Company, no extensions have been made during the year, other than the construction of a few additional side tracks at the Grand Canyon. There is in course of construction, however, by this company, a new hotel building at the Grand Canyon which will cost about $150,000 when completed. The travel to the Grand Canyon has increased during the year, demanding accommodations for tourists.

Col. Epes Randolph, who is now president of the Gila Valley, Globe and Northern Railway, which runs from Bowie, on the Southern Pacific, to Globe, reports no improvements on that road during the past year. Colonel Randolph is also president of the Cananea, Yaqui River and Pacific Railway, a Mexico project, and the Arizona and Colorado Rail-

way, now in operation from Cochise, on the Southern Pacific Railway, to Pearce, the home of the Commonwealth gold and silver mine. No extensions have been made in the latter line during the year.

The Southern Pacific traverses the southern counties of Arizona, passing through a rich mineral, stock-raising, and agricultural section of the Territory. Tucson is the division point of the road in this Territory from which the local operations are directed. Mr. T. R. Jones is superintendent, with headquarters at Tucson. The railway shops are located at that point, where large numbers of skilled machinists are employed. The pay roll at Tucson each month is said to be $150,000.

The company has followed the policy of improving its roadbed and track to meet the requirements of increased traffic, and in line with this have laid about 15 miles of new side tracks and reconstructed several portions of the line with a view of establishing better gradient and effecting more economical results in the handling of large volume of tonnage.

Incidental to the general increase in the weight of locomotives and rolling stock and the handling of larger train units, the Southern Pacific Company has found it necessary to make important renewals in bridges, and where economy justified it have replaced wooden trestles with steel spans and in small openings substituted concrete arch for other styles of culverts with a view of adding permanency as well as increasing the factor of safety.

The company has also found it desirable to develop a larger and more reliable water supply to meet the conditions and requirements above outlined, and have therefore erected large storage tanks at Tucson and Benson, constructed of steel and elevated high enough to give sufficient pressure for the economical handling of the water. These reservoirs have a capacity of 350,000 gallons each, and are supplied from existing wells. Other small tanks have also been erected, and the company has experimented with varying success in drilling new wells at different points on the division.

In anticipation of an increase in the amount of business, the company has now underway the erection of a large roundhouse at Tucson, which, with improved shop facilities, will greatly assist in the prompt handling of traffic.

The Southern Pacific Company continues to divert surplus supplies of fuel oil for the purpose of sprinkling its track and eliminate the dust nuisance, which has heretofore been one of the most annoying features of travel across the Arizona desert. The company hopes to complete the most of this work in the near future, and the results will be gratifying to the public as well as to the company.

The use of oil for fuel is being adopted as rapidly as possible to transform engines from coal to oil burners, and, in view of its greater economy, Superintendent Jones states that there is no question but that it will almost entirely supersede coal for fuel.

Mr. M. O. Bicknell, superintendent and general freight and passenger agent of the Maricopa and Phoenix and Salt River Valley Railroad Company, states that considerable progress has been made by this road during the fiscal year. The main line now enters almost the very business center of Phoenix, the road having been extended from Seventh street to First avenue. A branch, 2¼ miles in length, has also been built from a point on the main line one-third mile south of Kyrene siding due east.

The company has taken up 13 miles of 40-pound steel and replaced the same with 62-pound steel rails and new redwood ties. This 13 miles of track has been ballasted and oiled, at an expense of $150 per mile. The company has also replaced 1½ miles of 40-pound rails on the Mesa branch with 50-pound steel rails.

A handsome passenger depot has been erected in the city of Phoenix, on the corner of Center and Jackson streets, at an expense of $5,600, and a new freight station, 4 by 162 feet, has been erected on First avenue, between Jackson and Harrison streets, the cost of which was $5,200.

In the immediate future 22 miles of 40-pound steel will be replaced with 62-pound steel rails on new redwood ties, and the entire mileage of the line will be oiled. A steel bridge will be erected over Salt River, the structure to be 1,300 feet in length, and will rest on concrete piers. One 160-foot span will be placed over the Gila River. The improvements made by this road during the year have been substantial, and the company is in excellent condition to carry on its increasing traffic.

The El Paso and Southwestern Railway Company has constructed during the year 40½ miles of new line between Forest Station and Lewis Springs, for the purpose of bettering the grades. The maximum grade on the old line was 2½ per cent, and on the new line 1 per cent. Among the improvements made along this line were: A new passenger station at Naco; a new passenger and freight station at Hereford; a new freight and passenger station at Bisbee; a combination freight and passenger depot at Osborn; a 15-stall brick roundhouse at Douglass. Fourteen new locomotives of modern design were purchased during the year and placed in service; 60 steel ore cars of large capacity were purchased and placed in service; new passenger equipment to the extent of 3 baggage, 3 standard coaches, and 2 parlor dining cars were purchased and placed in use. The company also fenced 50 miles of its line. The road is all standard gauge. The total mileage is 356.6 miles, of which 156.4 are in Arizona.

The Arizona Eastern, a projected line from San Carlos on the Gila Valley, Globe and Northern Railway to Sentinel on the Southern Pacific, has come into prominence during the year by reason of active work under way along the Gila River. A great deal of money has been expended in grading, and the assurance is given that this road will be completed to Phoenix within the coming year. The Southern Pacific is supposed to be the projector of the new line, and it is regarded as a movement to bring that system through the Salt River Valley. The surveying party was close to Florence at the close of the year, and work upon the grade was progressing at the eastern end of the proposed line. It is contended that this line will shorten the transcontinental route over 60 miles. It will reduce the percentage of grade considerably if this line is used to displace the one between Gila Bend and Bowie, which is not altogether probable. While the Southern Pacific without doubt has intentions of entering the Salt River Valley, I do not believe that the line between Bowie and Sentinel will suffer to any great extent. That route is too firmly imbedded, and the country it traverses is too richly developed to give even passing credence to the rumor of abandonment.

TERRITORIAL PRISON.

The Territorial prison is located at Yuma. The annual report of the superintendent shows the condition of the prison and the general health of the inmates to be excellent. At the beginning of the fiscal year, July 1, 1903, there were in confinement 284 prisoners. At the close of the fiscal year there were 294 in confinement, showing an increase of 10 for the period covered by this report, against an increase of 3 for the preceding year. The nativity and sex of the inmates is given as follows:

Caucasians, 267; Indians, 13; negroes, 12; Chinese 1; total, 294. There is but one woman confined in the prison. The total number of prisoners received during the year by regular commitment was 115. The various counties sending prisoners during the year were: Coconino, 12; Cochise, 7; Graham, 27; Gila, 6; Maricopa, 16; Mohave, 3; Navajo, 6; Pima, 9; Pinal, 3; Santa Cruz, 1; Yavapai, 13; Yuma, 6; United States prisoners, 6; total, 115.

The prisoners released during the year numbered 107, of which 89 served full sentences, 4 were pardoned, 9 paroled, 3 died, 1 released by order of the supreme court, 1 on commutation of sentence. One United States prisoner was pardoned by the President, and the sentence of one commuted.

The gross cost of maintenance of the prison for the year was $50,647.43, from which should be deducted the earnings, amounting to $4,941.15, leaving the net cost $45,706.28. The net per capita cost for the year was $165.411. The gross expense is $4,822.10 less than the previous year, which is partly explained by the difference in the contract price of beef for the two years—being $1.23 less per hundredweight during the last year. The quantity of wood purchased during the past year was $520.13 less than the preceding year, and there is a difference in the quantity of prison stripes purchased, the total being $627.01 less than the year preceding.

The lands of the prison farm were available this year to some extent, owing to the absence of freshets and the consequent overflow of the cultivated areas. Computed at market rates, the products raised amounted to $117.70.

A great many improvements have been made at the prison during the year, including the extension of the prison wall, the construction of heavier gates, the construction of guard stands over the gateway and on the southwestern corner of the wall. Excavation work in the new yard is progressing nicely. A 7½-horsepower motor to operate the blower used to force air into the cells has been installed. A 60-gallon coffee boiler was also installed in the prison kitchen at a cost of $135. Frequently during the year the outer and inner surfaces of the prison walls have been replastered and the buildings repainted or whitewashed as required. The increased population of the prison necessitated the purchase of 5 steel-cell cages, which have been ordered by the board of control. A new cage building has been constructed west of the main cell house to receive these new cages.

Wood is used as fuel, it being purchased from the Indians at a cost of $3.10 per cord for mesquite, and $2.60 a cord for cottonwood and willow. During the year there were consumed 1,180½ cords, being about 40 cords less than the preceding year.

A certain amount of work is required of every able-bodied prisoner, the most of them assisting in the repair work under way. The manufacture of adobe bricks for use at the prison in construction work and for sale is carried on extensively.

The discipline has been excellent, only one attempt to escape being reported. There was a murder committed inside the prison during the year, Simon Alderete having been stabbed to death by Francisco Garcia, the latter having later been convicted and the death penalty passed. The superintendent of the prison gives the following account of the attempted outbreak:

On the morning of April 28 of the present fiscal year a daring attempt to escape was made by several convicts, headed by William Laustannau, No. 2029.

While making my usual morning rounds in company with the assistant superintendent, Mr. Wilder, we were seized by several convicts near the yard office in front of the garden, who attempted to overpower us. The guard on the wall near that point, who was armed with a short-barrelled shotgun loaded with buckshot, fired into the rioters at my command, unavoidably wounding Mr. Wilder in the leg, as well as slightly wounding a few of the convicts participating in the riot. The men then rushed us into the yard office to seek protection from the shots, but in the meantime, Cook W. T. Buck, No. 1644, who was standing near by, came to my assistance at my order. He was armed with a carving knife, and used it so ably that I was able to break away from my assailants. In the meantime, Mr. Wilder, who was resisting against overpowering odds, was stabbed near the heart and rendered senseless for a few minutes by a blow over the head with a large file held by one of the convicts.

The action of Convict Buck in attacking them with a knife confused the men so that the riot was practically quelled then, though not before four of the ringleaders attempted to follow out their original plan of escape by using the body of the assistant superintendent as a shield. They got as far as the gate with Mr. Wilder, who had partially recovered from the shock of the blow, but further progress was barred by the appearance on the walls of several armed guards.

During the mêlée four of the rioters were wounded by shots fired by the guard and by knife thrusts from Cook Buck, who, in addition to receiving a buckshot in the leg, was stabbed twice by the rioters, though fortunately not as serious as was at first feared.

The wounded convicts were taken to the hospital for treatment, and none of the wounds being very dangerous they were removed to dark cells for safe-keeping, and are still being held in solitary confinement pending the action of the grand jury.

There have been no escapes during the past year, owing to the vigilance of the officials of the prison and the guards.

The prison library is increasing each year, many additions having been made during the past fiscal year. There are now about 1,100 bound volumes. The library is well patronized by the inmates, they being allowed to take books from the library to their cells. All of the leading magazines and periodicals are kept on the library tables. Newspapers are not allowed to reach the hands of the convicts.

The prison school, which has been in operation for the past three years, has done a great deal of good. Many prisoners have learned to read and write by this means. The school is under the charge of a convict and attendance is not compulsory. Grammar, history, geography, arithmetic, and Spanish are taught.

The guards employed at the prison come from different sections of the Territory and are selected after rigid examination as to marksmanship and general character. The present force is probably the best the prison has ever had.

ASYLUM FOR THE INSANE.

The Territorial asylum for the insane is located near Phoenix, surrounded by trees and shrubbery. Substantial improvements have been made during the past year, and preparations are now underway for the construction of additional buildings.

At the close of the fiscal year there were domiciled in the asylum 226 persons, of whom 38 were females and 188 males. During the year there were received by commitment 121 patients, 25 of whom were females and 96 males. Treatment was given to 350 patients, 37 of whom were discharged as cured, 17 paroled, 34 died, and 7 escaped.

Of the 121 patients received at the asylum during the year 42 were committed from Maricopa County, 22 from Cochise, 15 from Pima, 11 from Yavapai, 6 from Graham, 5 each from Pinal, Coconino, and Mohave, 2 from Santa Cruz, 2 from Gila, 4 from Yuma, 1 from Apache, and 1 from Navajo. The causes assigned for the condition of the patients are many, alcoholism being responsible for 25 of the number. There are 5 male patients of the number received during the year over 70 years of age, 5 between 60 and 70, 15 between 50 and 60, 26 between 40 and 50, 25 between 30 and 40, and 19 between 16 and 30. Of the female patients 1 is past 70 years, 3 between 50 and 60, 5 between 40 and 50, 9 between 30 and 40, and 7 between 16 and 30.

The recovery rate for the year is 10.57 per cent of the number treated. The rate computed on the number admitted is 30 per cent. Patients are given thorough treatment from the time they enter the asylum, and each case is given careful attention at all times.

The cost of maintenance of this institution during the past fiscal year was $37,413.90, the sum of $7,022.86 represented in cash receipts and consumed from products having been deducted to give this net expense of $37,413.90. The net per capita cost of an average of 237.4 patients was $157.80, the net daily per capita cost being 43 cents.

The asylum is in excellent condition, but will be better able to accommodate the patients when additional buildings are erected, work upon which will soon be underway.

TERRITORIAL INDUSTRIAL SCHOOL.

The industrial school was formally opened December 1, 1903, appropriate exercises being held on the opening day, participated in by many leading citizens of the southern part of the Territory. The board of trustees, consisting of Mr. Ben Heney, Mr. H. Buehman, and Mr. A. H. Emanuel, has had a great deal to contend with in starting this school, but they have worked earnestly and placed the school on a solid basis for successful operation. Mr. F. R. O'Brien, of Cochise County, was selected superintendent, and from his report I have taken much of the information presented in this description.

At the close of the fiscal year there were 32 boys confined in the school. It would hardly be proper to say that they are confined, as their liberties cover a scope of many acres, and they are in no sense "herded." A careful watch is kept over them and attempts to escape are seldom made. The school was scarcely completed at the time of the opening, and many improvements and additions have been made during the year as the needs were felt.

While the cost of maintenance is very great at this time, consideration must be given to the fact that the greatest expense always comes with the opening of an institution of this kind and placing it in successful operation. The 32 boys confined there now would be occupying cells in county jails throughout the Territory, associated with hardened criminals, with all the influences of their surroundings tending to develop the criminal tendencies. Under the new conditions of confinement the boys are taught to work, their minds are diverted from misdeeds, their characters are developed in order that the best in them may be brought out, and when they leave the institution they are equipped mentally and physically to become good citizens of th Territory. As I have said before, the Territory and society is the gainer if but one boy is saved by this school.

Infants between the ages of 8 and 16 years are admitted to this institution for terms not less than one year nor more than five years when convicted of crimes that would be punishable by imprisonment in a county jail or the Territorial prison. Of the 32 boys in the school 14 were committed for crimes and would have been sent to jail and placed in close confinement were this institution not in existence. The remaining 18 were committed at the instigation of parents or guardians upon proof of the incorrigible character of the youths, 8 of this number having committed petty crimes that would have placed them in the custody of county sheriffs.

Careful attention is given to each individual inmate, and the boy is given to understand that whatever he has been charged with is not to be taken into consideration by the officers in the treatment of him, that he shall be given every opportunity to make amends for his misdeeds, and upon himself depends whether he will receive the full benefit of the training at the institution. The officers give him every assistance and a feeling of confidence is inspired, all phases of penal servitude being eliminated as much as possible. He is taught to consider the institution a school where he will learn a trade and be fitted for active work when he has served his sentence.

Military discipline is maintained, this being the main feature in carrying out the training of the youths. Two companies have been formed, one composed of the larger boys and the other of the smaller ones. These companies are under command of a captain, detailed from among the employees. Cadet officers are also appointed, thus giving responsibility to the boys and adding to the interest in drill and training along military lines. Military discipline is maintained from the time the boys awake in the morning until they retire, and whether awake or asleep the boys are under the surveillance of officers of the institution. The larger boys are separated from the smaller ones, owing to any bad influence they may have over them.

The course of study is that required by the Territorial school law in so far as possible to adopt. The smaller boys attend school in the morning from 9 to 11.45 o'clock, and the larger boys attend from 1 to 4 p. m. In the evening, under the charge of an instructor, the boys study for one hour, preparing their lessons for the next day. The boys are required to write to their parents or guardians every two weeks.

Considerable progress has been made by the inmates along industrial lines. They are instructed in carpenter work, painting, farming, shoe repairing, housework, etc. They wash and iron all the clothing

used by them; and in the kitchen the boys are detailed to assist, and special instruction is given them. The boys also assist the gardener and receive instruction in gardening and farming, the products raised being used at the school. Owing to lack of water but little farming is done. They are trained in housekeeping and serving in the dining-room at meal hours.

The daily routine of industry, study, and play shows that the inmates have no idle moments when they are not under the strictest surveillance. At 5.30 a. m. the boys arise, make their beds, and the night watchman turns them over to the captain at 6 o'clock. Assuming command the captain marches them downstairs to the toilet rooms. Until 6.30 the regular "setting-up exercises" are gone through with, the flag is raised and saluted, and the lines are again formed for the march to the dining hall for breakfast. At 7 a. m. the boys march to the detail grounds where each officer assumes his respective detail, the duties of which, for the smaller boys, require until 8.30 a. m., after which the boys prepare themselves for school work, which lasts from 9 a. m. to 11.45, the larger boys continuing at work until 11.30, when they report at the detail grounds and prepare for dinner. From twenty to thirty minutes are allowed for meals. After dinner the boys go to the playgrounds to romp until 12.50, when the larger boys prepare for school and the smaller ones are detailed by the officers to various work. At 4 p. m. the recall is sounded and the companies are formed, those requiring the attention of the doctor being marched to the dispensary, where they are examined and treated. From 4 to 5 o'clock the boys enjoy recreation on the playgrounds, entering heartily into the various forms of sport. Drill occupies their attention from 5 to 5.30, and at 6 o'clock supper is served. After supper they go to the school rooms, where they remain until 7.45, retiring at 8 p. m.

On Saturday and Sunday the daily routine is changed somewhat. Saturdays there are no school sessions, but the smaller boys work until 10 a. m., after which they bathe, repair their clothing, etc., which occupies them until dinner time. The larger boys continue work as on other days. In the afternoon all the boys work until 2 p. m., when the larger boys give their attention to bathing and repairing clothing until 3.30 p. m. From this time they enjoy recreation until 5 o'clock, from which hour the routine of other days is carried out. The boys bathe in a large cemented tank, half filled with water, a shower being connected with the plunge.

On Sundays no school sessions are held. The boys go through the routine of other days until 10 o'clock in the morning, when they attend church services, which are held in the town of Benson. The afternoon is largely given over to play.

Different forms of punishment are employed, such as marking time, extra work, and carrying the log, all of which is required to be done during the time allotted for play. Corporal punishment is not allowed and is only exercised by the superintendent or in his presence. The boys are treated kindly but with firmness, and strict obedience to the rules is required at all times.

Owing to the fact that the industrial school is a comparatively new institution the management and the conditions existing are gone into more fully than the older institutions receive. The industrial school is largely an experiment in this Territory, although its needs have been felt for years. How to conduct it with the greatest benefit to

the inmates is yet a problem, although I am glad to state that the institution is to-day in excellent condition and the success is most marked considering the short period of operation.

PUBLIC BUILDINGS.

The public buildings in Arizona show how stable the foundation of this new Commonwealth has been laid. The capitol is a credit to a progressive people, its appointments in many ways comparing favorably with many of the State buildings. The capitol is located at Phoenix, the capital city of the Territory, and occupies 10 acres of land which is laid out in trees of semitropical character, the capitol commanding a position in the center of the grounds. This building was constructed at a cost of $130,000, the final appropriation calling for the expenditure of $250,000.

The building is 184 by 84 feet, and four stories in height. Accommodations are provided in the building for the various Territorial officials, the legislature, and the surveyor-general. The grounds are well cared for, and contain numbers of deciduous trees, palms, roses, shrubs, and cactuses.

The rotunda of the capitol is 44 feet in diameter and extends from the ground floor through all the stories of the building to a height of 78 feet, being surmounted by a dome, which is crowned by a statue of Liberty 16 feet in height. The dimensions of the halls provided for the legislative bodies are 38 by 36 feet, and special attention has been given to the acoustic properties of these halls and to their ventilation. The gallery space in each hall has a seating capacity of between 200 and 300, and in the surrounding halls are the committee and other rooms required for the accommodation of the assembly. Spacious offices are also provided for the governor and other Territorial officers.

The Territorial prison is located at Yuma. Improvements have been made during the year in the buildings by the addition of necessary structures. The prison is in excellent condition and the inmates are given work throughout the year. Visitors from the States declare that the Arizona penitentiary is one of the best they have ever seen, the cleanliness and discipline being most noticeable.

The Territorial prison buildings are inclosed with a wall, the front and rear lengths of which are 290 feet, the sides being 321 feet long. This does not include the woman's department at the southwest corner, which is about 30 by 30 feet. The walls are 20 feet high, 8 feet thick at the bottom and 5 feet at the top, surmounted by a cement cap and coping. Inside of the walls is a cell house, 134 feet long by 65 feet wide, built of rock and iron. A building of adobe, 167 feet long by 34 feet in width, contains the engine room, boiler room, tailor and shoe shops, laundry and bath house, and library; and the kitchen and dining-room building is also of adobe, 110 by 21 feet. The dining room is 75 feet long and 18 feet wide inside. Outside the walls are the office of the superintendent, the same building (one story in height and 38 by 38 feet in size) being also used as a storehouse, and a 2-story building for the sleeping accommodations of the guards.

The University of Arizona is located at Tucson. During the past year additional buildings have been erected, including a $26,000 library and museum, and a new gymnasium which cost about $7,000. A new stamp mill has been erected also during the year on the grounds.

The university is situated upon high ground about a mile from the business center of the city, with which it is connected by a street-car line. On every side it commands a view of mountain scenery of remarkable extent and grandeur. The location can not be surpassed for healthfulness. The water supply for the university is drawn from a well on the premises 100 feet deep and is of unusually good quality.

The main building—University Hall—is 200 by 105 feet, two stories in height, and completely surrounded by a wide two-story veranda. The building contains the offices, recitation rooms, laboratories, and apparatus rooms of the various departments, an assembly room, the libraries of the university and experiment station, and the Territorial museum. Adjoining the main building is the mining annex, 80 by 60 feet, equipped with metallurgical machinery.

North Hall, a dormitory two stories in height, built of gray stone of fine quality, originally provided as a home for male students, is for the use of young women. It contains 16 rooms, each large enough to accommodate two students, a reception room, and a room used for women students in physical culture.

South Hall, a fine brick dormitory containing 40 rooms, with bath and toilet rooms, is for the use of male students and instructors.

A new dining hall with kitchen, 40 by 104 feet in size, provides ample room for all dormitory students.

Three brick houses, two stories in height, are occupied as homes by the president and instructors.

A substantial brick building contains a suite of rooms for the use of the commercial assaying department, the rooms being furnished with a large melting furnace, with necessary muffle furnaces and other accessories.

Joined in continuous structure with the assaying building are the shops of the mechanic-arts department, occupying an area of 80 by 95 feet, containing a room for mechanical and free-hand drawing and the machinery and appliances for the working of wood and iron.

Other buildings are the boiler house, which also contains the well and pumps whereby the water supply for irrigation and general purposes is obtained, a greenhouse 80 by 21 feet, a propagating house, the cottage occupied by the classes in domestic science, and a temporary wooden building used for various purposes.

The insane asylum consists of a main central building of brick, two wings of two stories, and basements. The main building is 100 feet long and 50 feet wide. A hall of 12 feet in width runs the entire length of the building. On each side of the central structure there is a wing 100 feet long and 40 feet in width, separated from the main building by a vestibule 16 feet wide. The outbuildings consist of a general dining room, 100 feet by 40 feet, with two wings each 16 by 20 feet. A building containing the engines, boilers, dynamos, and pumping plant, and the stables, carpenter shop, blacksmith and paint shops comprise the other buildings of importance. The ornamental grounds in front of the asylum contain 4 acres, tastefully stocked with trees, semitropical flowers, plants, and palms. The asylum is situated 2 miles east of the business section of Phoenix.

The normal school building at Tempe is a commodious structure, 136 feet long, 80 feet wide, and three stories high. The lower story is of brown sandstone, and the other two of pressed brick with sandstone trimmings. This edifice is beautiful in architectural design, convenient

in arrangement, and substantial in construction. All things considered, the building is excellently equipped for the purposes of normal school work. During the year the construction of a dormitory was completed.

The Northern Arizona Normal School is located at Flagstaff, in Coconino County, and is an important addition to the educational system of the Territory. The building is of stone, commodious, and convenient in its appointments. It is the finest public building in Arizona so far constructed except the capitol. The improvements made during the year will be found under the subject of education in the report of the president of the normal.

The Territorial Industrial School, at Benson, is contained in a single structure of considerable extent in its capacity to satisfy the present needs. It is one of the finest buildings in the Territory. The building is 120 feet in length and over 54 feet in depth, two stories in height. There is a basement 50 by 35 feet under each of the two wings of the building. White tufa stone is used throughout the building, and the inside facing is of brick. Substantial improvements have been made during the past year. The building was occupied in December, 1903, when the school was opened, and since that time it has been in constant operation.

The main building of the industrial school is a two-story structure of tufa stone. It contains the quarters for the superintendent, officers, and boys. On the first floor are the offices of the trustees and superintendent, superintendent's kitchen and dining room, the commissary's and clerk's office, reception room for visitors and parents of the boys, one schoolroom, dispensary and hospital, boys' kitchen and dining room. The upper floor has the superintendent's and officers' sleeping apartments, with toilet and bath for each apartment, one large dormitory containing 29 single beds, one small dormitory containing 9 single beds, one schoolroom, seating capacity for 21, single desks used. There are two basements under either wing of the building, one is being used for the commissary department and detention room, and the other for a play room, if needed in wet weather.

It has been necessary to remodel the main building to meet the needs of the institution; it was found necessary to remove the partition, where there were two small dormitories and make one large one, thereby adding to the healthfulness of the boys and avoiding the expense of an extra night watchman.

The main building is lighted with acetylene gas, the plant being of 50-light capacity. The machine is located about 150 feet from the main building. Twenty-five lights are used from dark until 8 p. m., and an average of 10 lights from then until daylight. The plant gives fairly good satisfaction.

In addition to the main building there are the following outside buildings: Wash room, closet, gas house, barn, wagon shed, tool house for gardener, and carpenter and paint shop. All of these buildings are erected of lumber and built since last October. In the wash room is a place where the boys have their lockers in which they keep all their belongings. This room is also used for laundry work and shoe repairing.

The 40 acres belonging to the school is fenced in by a picket fence 4 feet high near the main building for 600 feet on one side and 300 feet on the other, and the balance of the land is inclosed with a fence 4 feet high of three barbed wires and a rail. The picket portion of

the fence is painted and the one rail and posts are whitewashed. The work of erecting, painting, and whitewashing the fence was done by the boys under the supervision of an officer.

The water used at the school is furnished by two artesian wells. At the opening of the institution there was only one well, bored to a supposed depth of 1,075 feet, the flow from which was about half a gallon a minute. This was inadequate for the domestic needs of the institution and another well was bored to a depth of 883 feet which gave a little over eight gallons per minute. Even with the two wells the supply is limited. The water flows from the wells into a cistern 12 feet deep and 9 feet in diameter. From this it is pumped by a windmill into two tanks of 5,000 gallons capacity each and from the tanks it is distributed through pipes to the buildings and grounds.

POINTS OF GENERAL INTEREST.

The Grand Canyon of the Colorado in northern Arizona is the most interesting point in the Territory. During the past year the hotel accommodations have been improved and thousands of visitors have taken advantage of the railway which has shortened the journey and rid it of its discomforts. The large number of descriptive pamphlets issued by the railway companies have made the traveling public familiar with the facilities for handling the tourists and housing them at the canyon; and descriptions of the great gorge are easily attainable throughout the country. That this is the greatest wonder in the United States travelers all agree, and I am glad to report that the travel to the canyon has greatly increased during the year.

Another point of more than ordinary interest is the Natural Bridge, accessible by trail and wagon road.

This bridge spans Pine Creek, one of the tributaries of the upper Verde River, in Gila County, in the extreme northwest corner of Tonto Basin, and about 4 miles from the town of Pine. This remarkable natural formation of rock, spanning a deep chasm and forming a perfect bridge, is one of the wonders of the world and far exceeds the Natural Bridge of Virginia in extent and grandeur. The span of this bridge is 80 feet, and the width up and down the creek is 150 yards. The arch is perfect in form, and great limestone walls on either side curve to meet and sustain the arch, presenting a scene of great attractiveness and wonder. The stream which runs beneath the bridge and winds among the bowlders forms pools of unknown depths.

There are numerous caves, many of which have been explored, and little streams of water run through the crevices of the rocks and trickle from the roofs of the caves. Any article, whether of wood or soft substance, becomes petrified if placed in a position where the dripping water will saturate it. There is a hole in the bridge through which one can look down to the creek below, 126 feet.

Probably one of the most interesting curiosities in the Territory is the large petrified forest in Navajo County, which extends over many miles. Great trees, petrified to solid rock, and limbs and branches are found throughout the area covered by the forest. The texture of the dead trees is distinctly shown, and beautiful specimens from this forest are found on every hand. Fossils of animals of extinct species are found among the trunks of trees. Monarchs of a once mighty forest are here strewn about for miles, and every fiber preserved in shapely

forms of stone. This remarkable scene is but a few miles northeast from Holbrook, on the Atlantic and Pacific Railroad, and is visited by many tourists during the year.

The cliff dwellings in Yavapai and Coconino counties, Montezuma's well and castle in Yavapai County, the ice caves of the San Francisco Mountains, numerous hot springs in different parts of the Territory, and the ancient ruins of prehistoric interest are interesting to the tourist who travels in this Territory.

Arizona contains a number of excellent hot springs and other points of great interest. Hot Springs, in Yavapai County, is a resort which attracts hundreds of visitors every year, the water there being exceptionally good for the relief of persons suffering with rheumatism. Large and commodious hotels, beautiful grounds, and fine drives are provided for the accommodation of tourists.

Indian Hot Springs are located in Graham County and are recognized for their health-giving waters. They are reached by way of Fort Thomas, on the Gila Valley, Globe and Northern Railway.

Agua Caliente is in Maricopa County and is a resort visited by invalids from all parts of the Southwest. Accommodations are provided for visitors.

Hookers Hot Springs are located in Cochise County, near the Sierra Bonita ranch.

Near Tucson, in the Rincon Mountains, are hot springs of value.

Oracle is a mountain place in the Catalinas, situated among the pines, and is popular in summer time, owing to the cool climate which prevails.

Iron Springs, situated near Prescott, in the Bradshaw Mountains, is a popular summer resort easily accessible from Phoenix. Hundreds of Phoenix people spend their summers there.

The mission of San Xavier del Bac, first established in 1687—the present edifice having been built about one hundred years later—is an attraction which all travelers in southern Arizona visit. It is located 9 miles south of Tucson. The ruins of the San Augustine mission are interesting also, this crumbling edifice being within a mile of Tucson. It was built in 1762.

The famous Casa Grande ruins in Pinal County are of great historical interest and are visited by many travelers.

Montezuma's castle and well in Yavapai County are reached by an overland journey, and a visit to them is well worth the inconveniences of this manner of travel to one interested in prehistoric matters.

The mountains of Arizona provide natural scenery unsurpassed in any mountain region.

There are many streams where fishing attracts people from the valleys and plains during the summer months, and beautiful natural parks are found in the mountains, where escape from the heat of the valleys is provided. The altitude of the principal mountain ranges above sea level is as follows:

	Feet.
San Francisco Peak	12,561
Sierra Blanca	11,496
Mount Graham	10,516
Old Baldy (Santa Rita Mountains)	10,315
Santa Catalinas	9,950
Mount Kendrick	9,800
Mount Turnbull	9,500

	Feet.
Mount Sitgreaves	9,087
Bill Williams	9,080
Chiricahua	9,000
Mount Union (Sierra Prieta)	9,000
Four Peaks (Mazatzal Range)	8,600
Wallapai Mountain	8,000
Superstition Mountain	8,000
Baboquivari	7,000

HUNTING AND FISHING.

The open game season in Arizona for the years 1904 and 1905 is as follows: Quail, bobwhite, partridge, pheasant, snipe, rail, grouse, October 15 to March 1; ducks, geese, brant, doves, open all the year; trout, not less than 6 inches long, June 1 to September 1; black bass, strawberry bass, crappie, September 1 to December 1. The limit is 3 male deer in one season; 25 ducks and 25 quail in one day; fishing with hook and line only permitted; sale of game prohibited.

At the solicitation of the sportsmen of the Territory, the legislature of 1903 made some changes in the game laws, making the deer season earlier in the fall and two weeks longer, and making the season for killing ducks, geese, and brant open all the year. It was formerly the same as the quail season. Ducks do not breed in the Territory, are never here late in the spring, but are sometimes found in great numbers late in the summer or early in the fall, before the season opened under the old law.

The killing of antelope has been prohibited since 1901, and the small, scattered bands then in the Territory are reported to have multiplied rapidly. Very few have been killed except by the Indians, and prosecutions have been made for violations of the antelope law wherever found. The several varieties of deer in the Territory are becoming more numerous, and they may be easily found in any of the mountainous sections.

Quail are abundant all over Arizona, and it is not difficult to kill the "limit" any day of the open season. Doves in the winter and white-winged pigeons in the summer are more numerous than any other game birds we have, and are hunted extensively. The building of the Tonto reservoir and other irrigation works for storing water will bring large numbers of waterfowl here to winter, and it is believed will make Arizona one of the best shooting grounds for ducks and geese in the country.

In the mountain regions bear and mountain lions are still quite plentiful. The boards of supervisors of the different counties offer liberal rewards for scalps of wild animals ($20 for lion, $10 for bear, and $1 for wild cat or coyote), which results in several hundred being killed each year.

Several of the mountain streams abound in trout and bass. Black bass, crappie, and catfish have been placed in the rivers of central Arizona, and are doing well. Carp, suckers, and other fish peculiar to this section are very plentiful.

The elk rightly takes the lead among the game animals of Arizona, although the number left is very small.

Of the deer family there are six different kinds in Arizona, namely: The blacktail, whitetail, fantail, mule deer, burro deer, and Papago

or spotted deer. The blacktail, the first to feel the exterminating force of the hunter, is still with us, ranging from the northern portion as far south as the high mesas. Of late years, however, they are not often found below the pines.

The mule deer, first cousin to the blacktail, is somewhat more shy and its habitat is less exposed to the hunter. The blacktail still roams over a large portion of the middle and southern counties of the Territory, ranging in the lower country and sometimes found well out on the flat country, mixing with the burro deer.

The burro deer, a small, compact, gray animal, which retains its color of ash gray all the year around, is distinctly separated from other species of the deer family. The borro deer takes on its fat in the spring and summer months.

The whitetail and fantail are so near kin that the casual observer can see no difference, yet one exists, and he who studies can discover it. The habitat of these animals is in all parts of Arizona, high and low, among the pine, the oak, the juniper, and the mesquite.

The papago or mottled deer are very rare and hard to find. The existence of this animal has heen questioned by many hunters, but live specimens can yet be found. The habitat of this deer is the dry and almost inaccessible plains of southern Arizona. The papago or mottled deer is the smallest of the deer family.

The antelope or pronghorned is still to be found in portions of the Territory, but are fast disappearing.

The mountain sheep or big horn have been driven to the most isolated regions of the desert, and in a few years more they will have disappeared and become extinct.

Of the bear family there are five species—three known to hunters as "tree climbers," and two species known as the "long claws" or "ground fighters." Of the tree climbers the large brown bear is the most destructive to cattle, and is to be found in all portions of the Territory. The cinnamon bear is smaller, longer, and leaner than the brown bear, and harder to find.

The small black bear is plentiful in some portions of the country and the only species of the bear family good for man to eat. Of the long claws, the grizzly and silver tip are one and the same. They are to be found high up in the mountains in the summer, and during the fall months they come down to oak, juniper, and grapes. The little gray bear, whose average weight is about 400 pounds, belongs to a class by himself and is the most vicious animal, with one exception, we have in Arizona. He will spring and fight and is hard to kill.

Of the large cat family there are three kinds: The jaguar or American tiger, rarely found far away from the southern border; cougar or mountain lion, found all over the Territory, and the puma, a smaller animal than the cougar, rarely exceeding 6 feet in length from tip to tip, but very smooth of build and quick in action, and a great lover of chickens and other domestic fowls.

There are also three kinds of the bob or wild cat. The wolf family consists of the lobo, a large animal with a tawny and brown color, and when running in bands they are very destructive to range stock. The gray or mountain wolf is seldom found below the pine belts of the high mountains. The keiliola or prairie wolf, in partnership with the bussarel, are the most valuable scavengers and range over the entire

country. The red fox, crop (or silver-gray) fox, the small gray fox, the civet cat, the raccoon, pine squirrel, gray squirrel, and the rock squirrel are all found in Arizona.

The beaver is still found in portions of the Territory. The wild turkey, quail, and ringneck pigeon are also found here.

NEWSPAPERS.

Almost every place of any importance in the Territory is supplied with news by a local newspaper. There are 53 newspapers in the various towns of the Territory this year, two having been established since my last report. The greater number of the newspapers are Democratic in politics, but all of them devote their space mainly to giving the local news and showing the progress made in the different industries of their sections and the Territory at large. As a rule the newspapers receive generous patronage, and the wages paid the printers are controlled mainly by the local trade unions, and are considered fairly good.

The newspapers published in the Territory at the present time are as follows:

Apache County.—Snips and St. Johns Herald, St. Johns, weekly; Apachito, a Spanish weekly, St. Johns.

Cochise County.—Prospector, Tombstone, daily and weekly; Miner, Bisbee, daily; Review, Bisbee, daily; Dispatch, Douglas, daily; International-American, Douglas, daily; Press, Benson, weekly; Range News, Willcox, weekly.

Coconino County.—Sun, Flagstaff, weekly; Gem, Flagstaff, weekly; News, Williams.

Gila County.—Silver Belt, Globe, weekly.

Graham County.—Guardian, Safford, weekly; Era, Clifton, weekly; El Obrero, Clifton, weekly; Standard, Morenci, weekly.

Maricopa County.—Arizona and New Mexico Workman, Phoenix, weekly; Enterprise, Phoenix, daily; Gazette, Phoenix, daily; Republican, Phoenix, daily and weekly; Review, Phoenix, weekly; News, Tempe, daily and weekly; Free Press, Mesa, daily; Cattleman, Phoenix, weekly; Southwestern Stockman, Phoenix, weekly; News-Herald, Martinez, weekly; Miner, Wickenburg, weekly; El Mensajero, Phoenix, weekly.

Mohave County.—Arrow, Chloride, weekly; Miner, Kingman, weekly; Mineral Wealth, Kingman, weekly.

Navajo County.—Argus, Holbrook, weekly; Mail, Winslow, weekly.

Pinal County.—Blade, Florence, weekly.

Pima County.—Post, Tucson, weekly; Star, Tucson, daily and weekly; Citizen, Tucson, daily and weekly; Alianza, Tucson, weekly; El Fronterizo, Tucson, weekly; Cattleman and Miner, Tucson, weekly.

Santa Cruz County.—Oasis, Nogales, weekly; Times, Nogales, daily; Vidette, Nogales, weekly.

Yavapai County.—Arizona Journal-Miner, Prescott, weekly; Courier, Prescott, daily and weekly; Herald, Prescott, daily; News, Jerome, weekly; Reporter, Jerome, weekly.

Yuma County.—Sentinel, Yuma, weekly; Sun, Yuma, weekly.

At the United States Indian school near Phoenix the Native American is published monthly by the pupils, and at the University of Arizona during the school period a monthly publication is printed under the direction of the students. The Tempe Normal School also published a monthly during the term.

BOARD OF LOAN COMMISSIONERS.

Considerable county and Territorial indebtedness was funded by the loan commission during the year. The application of the city of Tucson for the funding of $12,000 of bonds of that city was favorably

acted upon at a meeting held September 1, 1903. The Tucson bonds bore interest at the rate of 7 per cent per annum, and the city was unable to pay the principal and interest when it came due. Territorial 5 per cent 50-year bonds were issued in redemption of this indebtedness.

The last bond in the Yavapai County P. & A. C. Railroad bond series, amounting to $1,000 and accrued interest, was funded by the commission September 1. A typewritten bond of $275.29 was issued in the final settlement of the Pima County narrow gauge railway case, and on September 1 the commission made its final return to the supreme court in the matter.

On January 2, 1904, the commission received an application from Maricopa County for the refunding of $15,000 of county indebtedness bearing interest at 7 per cent per annum. Favorable action was taken on this application, Territorial 5 per cent bonds being issued.

Application was made by the holders of 30 Santa Cruz County 7 per cent coupon bonds, issued by that county to Pima County in the adjustment of indebtedness on the creation of the new county of Santa Cruz from Pima County, the said bonds having been indorsed by Pima County payable to the applicant. With accrued interest the amount due was $31,125.83, the commission issuing 31 bonds of $1,000 denomination each and Santa Cruz County paying the balance of $125.83 in cash on the day the exchange was made.

A great number of meetings were held during the year for the consideration of matters upon which no favorable action was taken.

ARIZONA AT THE WORLD'S FAIR.

The legislature of Arizona authorized the issuance of $30,000 of Territorial bonds for the purpose of presenting at the Louisiana Purchase Exposition a representative exhibition of Arizona's varied resources. These bonds were sold for $32,100, a premium of 7 cents on the dollar.

This sum gave the board of managers for Arizona ample equipment for carrying out the desire of the people of the Territory. The exhibit at St. Louis is not only a credit to Arizona but to the great mining, stock-raising, and agricultural section of the United States.

A modest Territorial building was erected on the World's Fair grounds, prominently located at the entrance upon the State plateau, at the head of the grand galaxy of State buildings. The building is in charge of a member of the Arizona board of managers, assisted by Miss Jennie Drais, of Prescott.

Arizona is represented in five different departments of the Fair, including the State building. The exhibits embrace a comprehensive display of Territorial products, carefully selected by the members of the board from the various counties of the Territory.

The mineral exhibit in the Palace of Mines and Metallurgy is in charge of Mr. Ernest E. Ford, a prominent metallurgist of Arizona. This exhibit is noted exceptionally for its completeness, the ores being characteristic of the many mineral-producing sections of the Territory. This exhibit, when the Exposition shall close, will be placed in the school of mines connected with the University of Arizona.

The educational exhibit is in charge of Miss Emma E. Ford, an experienced teacher, of Phoenix. It is located upon one of the main

aisles in the Educational Palace, adjoining the California exhibit. It consists of handwork, from the kindergartens to the academic branches, drawings, paintings, and other evidences of the advancement of Arizona children.

The agricultural exhibit in the Palace of Agriculture, in charge of N. C. Bernard, of Tucson, located upon the aisle next to the main aisle, is strictly a representative exhibit of all the products grown in the Territory from the different sections, and is receiving marked attention from the eastern farmer, whom it is difficult to convince that much of the products came from the second and third crop by irrigation.

The horticultural exhibit, in charge of Mr. Mont M. Mansfeld, of Tucson, is very favorably located at the east end of the Palace of Horticulture, across the end of the main center aisle, which gives it prominence and a conspicuous view from the entire length and breadth of the building. The exhibit is typically representative of Arizona's fruit products of all kinds from the different fruit-growing sections of the Territory, and is greatly admired and highly complimented by the eastern horticulturists.

At the Territorial building and at all of the exhibit booths such literature pertaining to the resources and description of the Territory as could be obtained is distributed to all seeking information regarding the Territory.

In collecting and mobilizing the exhibits the board is much indebted to the several railroads of the Territory for their assistance and cooperation, they having taken up the exhibits at the various points and delivered them to the points of mobilization, and also furnished transportation to members of the board and their assistants.

RECOMMENDATIONS.

1. That Arizona's claims to statehood be given due consideration, and that such aid as lies within the power of the Interior Department be extended to secure the passage of an enabling act for the admission of the Territory to statehood within the present Territorial limits.

2. That the influence of the Department be exerted, wherever consistent, in opposition to the passage of the bill now before the Senate of the United States making of the Territories of New Mexico and Arizona one State, to be known as Arizona, such a union of the two Territories being inimical to the best interests of both and opposed to the wishes of the people of Arizona, who prefer a Territorial form of Government to admission in the manner proposed.

3. That the Congress of the United States be requested to reimburse Pima County, Ariz., in the sum of $318,275.29 by direct appropriation, as being repayment to said county for an injustice committed by Congress in passing an act which validated certain 150 bonds, with accrued interest, known as the "Pima County Narrow Gauge Railroad bonds," after the entire issue of said bonds had been declared by the Supreme Court of the United States to be invalid and void and for which Pima County had never received value.

4. That the Indian school facilities in Arizona be increased in order to more quickly prepare the younger generation to become self-supporting, and that measures be taken to more properly care for the graduates of these schools by finding for them proper employment, thus aiding in preventing their return to former modes of life.

5. That appropriate measures be taken looking to the rejuvenation of the depleted forest area in this Territory, and that a system of tree and tree-seed planting be inaugurated by the Division of Forestry in order that the watersheds of the various streams in the Territory may be kept unimpaired as sources of water supply.

6. That further and extensive systems of water storage and systems of power under the provisions of the reclamation act be inaugurated in Arizona until all flood and subsurface waters are made available for purposes of irrigation.

7. That appropriate measures be taken by the Department looking to the development of the irrigation resources of the various Indian reservations within the limits of the Territory, in order that the members of the various tribes resident thereon may ultimately be greatly benefited by such development and be made absolutely self-sustaining.

8. That appropriations be made for the purchase of sites and the erection of public buildings in cities in this Territory where the same can be shown to be of ultimate benefit to the General Government.

9. That the appropriation for the contingent expenses of the governor's office be increased sufficiently to provide additional clerical force when needed from time to time for the expedition of the increased business of the office.

10. That the injustice of the Congress of the United States in failing to appropriate the amount allowed as the salary of the governor of the Territory of Arizona be called to its attention.

Very respectfully,

ALEXANDER O. BRODIE,
Governor of Arizona.

Hon. E. A. HITCHCOCK,
Secretary of the Interior, Washington, D. C.

APPENDIX.

TERRITORIAL AUDITOR.

List of warrants drawn on the various funds from July 1, 1903, to June 30, 1904.

Contingent expenses	$725.00
Territorial asylum for the insane	3,571.78
Territorial prison	4,836.38
Governor's contingencies	240.90
Expense superintendent public health	188.15
Live stock sanitary board	12,244.65
Territorial board of equalization	1,316.40
District judges	6,000.00
Salary:	
Territorial auditor	2,350.00
Territorial treasurer	2,500.01
Citizen member board of control	1,800.00
And expense attorney-general	1,200.00
Territorial librarian	50.00
Assistant Territorial librarian	550.00
Private secretary to the governor	1,775.00
Clerk board of control	810.00
Adjutant-general	581.65
Auditor's clerk	1,500.00
Assistant secretary of the Territory	1,200.00
Superintendent public health	983.50
Corporation clerks	1,825.00
Deputy clerk supreme court	825.00
Expense:	
Auditor's office	500.00
Board of control office	250.00
Board of control traveling	79.70
Telephone rent	120.00
Territorial museum	100.00
Relief Mrs. Aceana Tafolla	300.00
Subscription Territorial library	14.00
Subscription Territorial library	75.00
Necessary expense National Guard, Arizona	2,295.00
Expense adjutant-general	127.30
Actual service expense National Guard, Arizona	6,442.50
Inspection account National Guard, Arizona	102.85
Public printing	1,169.31
Arizona Rangers	11,113.23
Expense loan commission of Arizona	475.13
Furniture and fixtures Territorial offices	645.75
Expense Territorial library	3,610.79
Education deaf, dumb, and blind	1,500.00
Insurance Territorial library	420.00
Equipping and furnishing gymnasium and library university	2,072.58
Expense National Guard, Arizona	50.00
General fund	78,536.56
University fund	23,177.23
Territorial school fund	35,406.75

Normal school fund	$29,373.51
Insane asylum fund	34,640.94
Territorial prison fund	45,374.74
License and inspection fund	15,045.27
Northern Arizona Normal School fund	18,942.15
Capitol building fund	6,099.29
Insane asylum improvement fund	3,699.12
Territorial prison improvement fund	4,025.68
Territorial industrial school fund	25,338.18
Tempe Normal School building fund	20,687.01
Ranger fund	21,749.16
Normal School of Arizona dormitory fund	290.87
Total expense Territorial funds	362,386.46

Statement showing amount of outstanding warrants June 30, 1904.

General fund warrants	$3,147.07
University fund	13.85
Territorial school fund	8.35
Normal school fund	18.30
License and inspection fund	311.40
Capitol building fund	22.45
Industrial school fund	1,100.65
Ranger fund	1,180.00
Total	5,802.07

Statement of general fund warrants outstanding June 30, 1904.

Balance June 1, 1904, issue prior to 1900	$1,492.96
Balance June 1, 1904, issue of 1901	12.00
Paid during June, 1904 (interest $2.04)	12.00
Balance June 1, 1904, issue of 1902	135.00
Balance June 1, 1904, issue of 1903	1,400.01
Balance June 1, 1904, issue of 1904	101.00
Issued during June	4,442.58
Total	4,543.58
Paid during June	4,424.48
Balance outstanding June 30	119.10

RECAPITULATION.

Balance June 30, 1904, issue prior to 1900	1,492.96
Balance June 30, 1904, issue of 1902	135.00
Balance June 30, 1904, issue of 1903	1,400.01
Balance June 30, 1904, issue of 1904	119.10
Total	3,147.07

Bond account June 30, 1904.

Page.				
370	Bond account			$3,055,275.29
400	Funding bonds, account Territory:			
	6 per cent	$140,000.00		
	5 per cent	665,972.43		
			$805,972.43	
402 to 415	City and county funded debt		2,044,302.86	
452	Insane asylum bonds		20,000.00	
454	University of Arizona bonds		25,000.00	
456	World's Fair bonds		30,000.00	
457	Capitol building bonds		100,000.00	
458	St. Louis World's Fair bonds		30,000.00	
				3,055,275.29

Funded debt account June 30, 1904.

Page.			
392	Funded debt account		$2,044,302.86
402	Apache County funded indebtedness	$43,473.50	
403	Coconino County funded indebtedness	159,000.99	
404	Graham County funded indebtedness	147,364.70	
405	Gila County funded indebtedness	44,781.36	
406	Maricopa County funded indebtedness	281,636.43	
407	Mohave County funded indebtedness	105,363.29	
408	Pima County funded indebtedness	528,515.34	
409	Pinal County funded indebtedness	136,138.08	
410	Yavapai County funded indebtedness	338,740.07	
411	Yuma County funded indebtedness	88,791.11	
412	Prescott City funded indebtedness	91,261.90	
413	Tucson City funded indebtedness	27,423.71	
414	Tombstone City funded indebtedness	13,812.38	
415	Navajo County funded indebtedness	38,000.00	
			2,044,302.86

Statement showing amount of fees received from incorporations from March 19, 1903, to June 30, 1904.

1903.		1904.	
March	$1,023.90	January	$2,170.15
April	3,326.00	February	3,096.60
May	2,822.60	March	2,905.15
June	3,002.30	April	2,833.75
July	2,634.15	May	2,821.50
August	2,349.40	June	2,579.40
September	2,517.70		
October	2,330.70	Total	41,111.25
November	2,555.05		
December	2,142.90		

Statement of warrants and coupons canceled during June, 1904.

Warrants:		
	Territorial school fund	$340.80
	University fund	1,201.58
	Territorial prison fund	3,906.74
	Capitol-building fund	370.06
	License and inspection fund	404.05
	Territorial industrial-school fund	874.75
	Ranger fund	2,475.57
	Territorial prison-improvement fund	253.84
	General fund	4,436.48
	Insane-asylum fund	2,781.25
	Agricultural college	5,000.00
	Total	24,570.12
Coupons:		
	From 5 per cent funding bonds, 1 No. 23, due January 15, 1904 ($25)	25.00
	From capitol building interest, 100 No. 12, due June 1, 1904 ($25)	2,500.00
	Total	2,525.00

TERRITORIAL TREASURER.

Statement of the bonded indebtedness of the Territory of Arizona on June 30, 1904.

Date.	Title.	Time.	Rate.	Amount.
		Years.	*Per cent.*	
July 1, 1885	Insane-asylum bonds	20	7	$20,000.00
Jan. 15, 1888	Territorial funding bonds	25	6	140,000.00
July 15, 1892	.....do	50	5	2,000,000.00
Jan. 15, 1896	.....do	50	5	300,000.00
Jan. 15, 1903	.....do	50	3	318,275.29
Do	.....do	50	5	92,000.00
July 1, 1892	World's Fair bonds	20	5	30,000.00
June 1, 1898	Capitol-building bonds	50	5	100,000.00
Jan. 2, 1902	University bonds	20	5	25,000.00
Jan. 1, 1903	St. Louis Exposition bonds	20	5	30,000.00
	Total			3,055,275.29
	Deduct county and city funded indebtedness			2,044,302.86
	Total bonded debt of the Territory			1,010,972.43

The entire floating debt of the Territory has been wiped out, leaving the sum of $20,848.85 in the general fund.

Receipts from all sources for the year ended June 30, 1904.

Balance, July, 1903	$177,762.54	
Apache County	13,254.16	
Cochise County	57,061.91	
Coconino County	41,029.00	
Gila County	16,427.66	
Graham County	47,209.08	
Maricopa County	120,280.61	
Mohave County	16,772.74	
Navajo County	15,728.36	
Pima County	49,201.61	
Pinal County	22,563.19	
Santa Cruz County	13,985.02	
Yavapai County	115,096.90	
Yuma County	15,568.43	
Prescott city	4,563.10	
Tucson city	1,085.60	
Tombstone city	690.62	
Revised Statutes sold	453.65	
Fees, articles of incorporation	31,359.35	
Secretary board of control	4,109.10	
Insurance tax	19,350.12	
Superintendent Territorial prison	6,993.05	
Secretary live-stock sanitary board	14,203.47	
United States Treasurer	25,000.00	
Balance on bonds sold	145.25	
Refund from university	27.75	
		$829,922.27

DISBURSEMENTS.

General fund	173,163.92
Asylum for insane, interest fund	36,740.94
Asylum for insane, improvement fund	3,699.12
Asylum for insane, redemption of bonds	10,154.00
University interest fund, par. 3663	1,250.00
University fund	23,198.23
Normal-school fund	30,582.47
Normal-school dormitory fund	290.87
Northern Arizona Normal-School fund	19,058.15
Territorial school fund	35,406.75
Territorial interest fund	136,223.26

Territorial prison fund	$45,375.64	
Territorial prison-improvement fund	6,519.37	
Capitol-building fund	6,076.84	
Capitol interest fund	5,175.00	
Territorial Industrial School	24,246.36	
License and inspection fund	14,760.87	
Agricultural college	25,000.00	
Interest World's Fair bonds	1,500.00	
Interest St. Louis Exposition bonds	750.00	
Tempe Normal School building fund	20,687.01	
Ranger fund	20,769.66	
Cash on hand June 30, 1904	189,293.85	
		829,922.27

Statement of the balances in the various funds in the Territorial treasury June 30, 1904.

General fund	$23,995.92
Insane-asylum fund	16,042.24
University interest fund	1,977.02
Normal-school fund	55.84
Territorial school fund	3,034.84
Territorial interest fund	73,967.11
Northern Arizona Normal-School fund	176.47
Redemption fund	1,113.21
University fund	13,806.44
Interest on World's Fair bonds	940.43
Prison fund	22,833.90
Capitol-building fund	8,505.74
Capitol interest fund	1,989.52
Insane-asylum improvement fund	3,684.49
License and inspection fund	5,426.26
Territorial Industrial-School fund	6.02
Ranger fund	2,645.59
Prison-improvement fund	5,051.07
Northern Arizona Normal-School fund	236.16
Tempe Normal-School building fund	1,649.11
Interest St. Louis International Exposition bonds	1,329.87
University interest fund	709.98
Normal School of Arizona dormitory fund	116.62
Total	189,293.85

The Territorial funds have been deposited in several of the banks of Arizona for safe-keeping, a sufficient bond in the sum of $50,000 having been provided by each of the banks for the protectiou and security of the funds so deposited. The distribution of the Territorial funds in the various banks on June 30, 1904, was as follows:

The Valley Bank of Phoenix	$40,129.05
National Bank of Arizona, Phoenix	19,640.43
The Bank of Arizona, Prescott	21,238.30
Consolidated National Bank, Tucson	22,102.33
Bank of Bisbee, Bisbee	13,644.89
Gila Valley Bank and Trust Company, Solomonville	5,043.93
Guaranty Trust Company, New York	65,124.13
Phoenix National Bank	2,370.79
Total	189,293.85

BANK COMPTROLLER.

The Territorial auditor also acts as the bank comptroller in this Territory.

Condition of Territorial banks, June 30, 1904.

RESOURCES.

Name of bank.	Loans, discounts, and overdrafts.	Stocks, securities, and claims.	Real estate, furniture, and fixtures.	Cash and due from banks.
Bank of Arizona, Prescott	$544,050.28	$177,610.00	$45,600.00	$422,016.09
The Bank of Bisbee, Bisbee	462,521.46	106,738.92	16,250.00	464,186.86
The Arizona Central Bank, Flagstaff	423,413.31	20,893.82	45,607.66	136,535.71
The Valley Bank, Phoenix	256,665.48	140,521.48	110,120.00	122,254.51
Farmers and Merchants' Bank, Tempe	208,992.89	692.92	6,097.00	51,336.04
Gila Valley Bank and Trust Co., Solomonville	202,340.16	24,119.91	6,700.00	122,803.14
Miners and Merchants' Bank, Bisbee	234,309.00	19,618.32	25,388.70	129,464.29
Bank of Douglas, Douglas	134,464.56	23,704.53	4,075.32	158,256.21
Mesa City Bank, Mesa	91,196.49	2,517.53	5,103.95	18,404.18
The Bank of Safford, Safford	70,371.34	2,123.44	1,250.00	20,379.72
Bank of Yuma, Yuma	55,515.90	3,055.22	5,000.00	23,371.74
Home Savings Bank and Trust Co., Phoenix	44,080.72	.....	4,263.27	12,365.71
Southern Arizona Bank and Trust Co., Tucson	93,441.91	13,180.60	6,323.33	70,950.33
Commercial Trust Co., Prescott	177,045.80	12,000.00	1,500.00	5,367.01
Navajo County Bank, Winslow	85,333.13	.....	9,581.15	27,447.29
Miners and Merchants' Bank, Globe	48,329.86	5,713.55	4,504.22	30,486.43
Apache County Bank, Concho	24,985.59	1,746.84	700.62	14,228.43
J. W. Thornton & Son, Yuma	38,472.18	5,180.13	3,633.26	17,177.30
Graham County State Bank, Thatcher	18,345.38	3,444.71	1,722.90	6,749.52
Old Dominion Commercial Co., Globe	7,327.25	4,970.67	4,903.00	98,717.84
Bank of E. F. Sanguinetti, Yuma	18,982.29	2,937.07	.....	4,478.98
Gosney & Perkins Bank, Flagstaff	30,226.06	1,119.41	7,439.08	27,044.60
Total	3,270,411.04	571,889.07	315,763.46	1,984,021.93

LIABILITIES.

Name of bank.	Capital stock.	Surplus and undivided profits.	Deposits.	Total.
The Bank of Arizona, Prescott	$50,000.00	$100,000.00	$1,039,276.37	$1,189,276.37
The Bank of Bisbee, Bisbee	50,000.00	65,794.01	933,903.23	1,049,697.24
The Arizona Central Bank, Flagstaff	100,000.00	3,640.67	522,809.83	626,450.50
The Valley Bank, Phoenix	100,000.00	32,939.26	496,622.21	629,561.47
Farmers and Merchants' Bank, Tempe	40,000.00	17,782.79	209,336.06	267,118.85
Gila Valley Bank and Trust Co., Solomonville	50,000.00	18,539.50	287,423.71	255,963.21
Miners and Merchants' Bank, Bisbee	50,000.00	15,071.30	343,709.01	408,780.31
Bank of Douglas, Douglas	35,000.00	10,256.61	275,244.01	320,500.62
Mesa City Bank, Mesa	25,000.00	4,990.37	87,231.78	117,222.15
Bank of Safford, Safford	10,000.00	2,713.98	81,410.52	94,124.50
Bank of Yuma, Yuma	10,000.00	1,018.42	75,924.44	86,942.86
Home Savings Bank and Trust Co., Phoenix	10,610.00	1,596.74	48,502.96	60,709.70
Southern Arizona Bank and Trust Co., Tucson	50,000.00	4,497.32	129,398.85	183,896.17
Commercial Trust Co., Prescott	50,000.00	12,441.83	133,470.98	195,912.81
Navajo County Bank, Winslow	25,000.00	7,043.44	90,318.13	122,361.57
Miners and Merchants' Bank, Globe	25,000.00	5,978.07	58,055.99	89,034.06
Apache County Bank, Concho	15,200.00	3,516.58	22,944.19	41,661.48
J. W. Thornton & Son, Yuma	20,000.00	3,194.57	41,268.30	64,462.87
Graham County State Bank, Thatcher	10,000.00	2,893.46	17,369.05	30,262.51
Old Dominion Commercial Co., Globe	22,500.00	46,292.93	47,125.83	115,918.76
Bank of E. F. Sanguinetti, Yuma	.....	3,001.05	23,397.29	26,398.34
Gosney & Perkins Bank, Flagstaff	20,000.00	1,453.93	44,375.22	65,829.15
Total	768,310.00	364,656.83	5,009,118.67	6,142,085.50

National banks of Arizona.

RESOURCES.

Name of bank.	Loans, discounts, and overdrafts.	Stocks, securities, and claims.	United States bonds and premiums.	Cash and due from banks.	United States redemption fund.	Banking house, furniture and fixtures.
Phoenix National Bank, Phoenix	$458,099.10	$110,877.36	$100,000.00	$359,711.18	.....	$4,000.00
Prescott National Bank, Prescott	436,972.66	32,748.16	154,000.00	271,633.32	$5,000.00	47,989.64
National Bank of Arizona, Phoenix	331,852.24	21,517.80	50,000.00	229,421.75	1,370.00	13,533.92
Consolidated National Bank, Tucson	362,641.71	67,547.50	106,200.00	545,672.64	.....	25,000.00
First National Bank of Globe, Globe	201,538.82	.....	53,445.31	86,747.58	.....	10,500.00
Arizona National Bank, Tucson	165,470.14	41,003.18	13,000.00	256,496.34	625.00	11,596.44
First National Bank of Clifton, Clifton	101,703.67	.....	31,392.18	25,964.54	1,500.00	10,937.58
First National Bank of Douglas, Douglas	117,525.03	1,603.93	13,400.00	99,495.82	625.00	14,664.22
First National Bank, Tombstone	83,592.75	20,382.12	6,500.00	57,326.02	325.00	2,003.20
Tempe National Bank, Tempe	61,746.16	1,145.49	6,593.75	31,319.42	312.50	2,300.00
First National Bank, Nogales	53,348.48	10,267.16	6,625.00	56,942.29	312.50	2,913.90
Total	2,374,490.76	307,092.70	541,156.24	2,020,730.90	10,070.00	145,438.90

LIABILITIES.

Name of bank.	Capital stock.	Surplus and undivided profits.	National-bank notes outstanding.	Deposits.	Total.
Phoenix National Bank, Phoenix	$100,000.00	$89,319.25	$100,000.00	$743,368.39	$1,032,687.64
Prescott National Bank, Prescott	100,000.00	75,604.24	100,000.00	672,739.54	948,343.78
National Bank of Arizona, Phoenix	100,000.00	57,778.39	36,906.32	453,011.00	647,695.71
Consolidated National Bank, Tucson	50,000.00	56,162.89	50,000.00	950,898.96	1,107,061.85
First National Bank of Globe, Globe	50,000.00	5,597.87	50,000.00	246,633.84	352,231.71
Arizona National Bank, Tucson	50,000.00	24,847.72	3,850.00	409,493.38	488,191.10
First National Bank of Clifton, Clifton	30,000.00	9,630.52	30,000.00	101,867.45	171,497.97
First National Bank of Douglas, Douglas	50,000.00	5,883.35	12,500.00	178,930.65	247,314.00
First National Bank, Tombstone	25,000.00	7,241.00	6,500.00	131,388.09	170,129.09
Tempe National Bank, Tempe	25,000.00	1,666.99	5,250.00	71,500.33	103,417.32
First National Bank, Nogales	25,000.00	.....	6,250.00	99,159.33	130,409.33
Total	605,000.00	333,732.22	401,256.32	4,058,990.96	5,398,979.50

COMPARATIVE STATEMENT TERRITORIAL BANKS.

	1903.	1904.	Gain.
RESOURCES.			
Loans, discounts, and overdrafts	$3,009,917.79	$3,270,411.04	.....
Stocks, securities, and claims	689,143.64	571,889.07	.....
Real estate, furniture, and fixtures	262,678.43	315,763.46	.....
Cash and due from banks	1,863,335.33	1,984,021.93	.....
Total	5,825,075.19	6,142,085.50	$317,010.31
LIABILITIES.			
Capital stock	773,310.00	768,310.00	.....
Surplus and undivided profits	301,195.21	364,656.83	.....
Deposits	4,750,569.98	5,009,118.67	.....
Total	5,825,075.19	6,142,085.50	317,010.31
AGGREGATE IN TERRITORIAL AND NATIONAL BANKS.			
Territorial banks	4,750,569.98	5,009,118.67	258,548.69
National banks	3,730,784.12	4,058,990.96	328,206.84
Total	8,481,354.10	9,068,109.63	586,755.53

Condition of building and loan associations.

RESOURCES.

Name.	Loans on real estate.	Loans on stock.	Sundry assets.	Real estate.	Cash.
Tucson Building and Loan Association, Tucson	$217,845.00	.....	$107,831.61	$9,098.98	$8,780.23
Citizens' Building and Loan Association, Tucson	234,337.85	$23,594.77	8,536.01	2,167.69	25,229.89
Phoenix Building and Loan Association, Phoenix	132,375.19	9,442.20	2,817.42	21,287.28	7,165.36
Nogales Building and Loan Association, Nogales	92,160.00	.....	4,015.22	.....	3,361.94
Arizona Mutual Savings and Loan Association, Phoenix	41,733.40	5,784.21	661.58	773.20	11,461.89
Arizona Savings and Investment Co., Tucson	.....	66,653.98	5,666.20	14,300.80	47,200.19
Arizona Building and Loan Association, Tucson	21,900.00	1,100.00	956.54	252.85	489.73
Total	740,351.44	106,575.16	130,484.58	47,880.80	103,689.23

Liabilities.

	Capital stock accumulating.	Undivided profits.	Sundry accounts.	Bills payable.	Total.
Tucson Building and Loan Association, Tucson	$141,993.11	$189,154.54	$12,408.17	.....	$343,555.82
Citizens Building and Loan Association, Tucson	288,139.99	5,726.22	.....	.....	293,866.21
Phoenix Building and Loan Association, Phoenix	171,828.49	293.23	965.73	.....	173,087.45
Nogales Building and Loan Association, Nogales	92,062.86	4,900.30	2,485.50	$88.50	99,537.16
Arizona Mutual Savings and Loan Association, Phoenix	57,626.06	2,398.16	390.06	.....	60,414.28
Arizona Savings and Investment Company, Tucson	132,603.65	1,217.52	.....	.....	133,821.17
Arizona Building and Loan Association, Tucson	21,828.97	400.32	469.83	2,000.00	24,699.12
Total	906,083.13	204,090.29	16,719.29	2,088.50	1,128,981.21

Comparative statement.

Resources.	1903.	1904.	Gain.
Loans on real estate	$731,817.84	$740,351.44	.....
Loans on stock	19,895.90	106,575.16	.....
Sundry assets	23,607.93	130,484.58	.....
Real estate	31,899.95	47,880.80	.....
Cash	22,272.97	103,689.23	.....
Total	829,494.59	1,128,981.21	$301,486.62

Statement of fees received by the bank comptroller during the fiscal years ending June 30 1903 and 1904.

License fees, 1903:		
From 33 banking institutions, at $5	$165.00	
From 7 building and loan associations, at $5	35.00	
		$200.00
License fees, 1904:		
From 30 banking institutions, at $5	150.00	
From 10 building and loan associations, at $5	50.00	
		200.00
Examination fees, 1903:		
Nine institutions, at $40 each	360.00	
Four institutions, at $35 each	140.00	
Thirteen institutions, at $30 each	390.00	
Six institutions, at $25 each	150.00	
		1,040.00

Examination fees, 1904:		
Eight institutions, at $40 each	$320.00	
Four institutions, at $35 each	140.00	
Sixteen institutions, at $30 each	480.00	
Six institutions, at $25 each	150.00	
		$1,090.00
Total fees received		2,530.00

BOARD OF EQUALIZATION.

Tax levy for 1904.

	On each $100.
General fund, paragraph 3831, R. S. of 1901	$0.20
Insane asylum interest fund, paragraph 3615, R. S. of 1901	.10
Normal school fund, paragraph 3702, R. S. of 1901	.05
Territorial school fund, paragraph 2246, R. S. of 1901	.03
University fund, paragraph 3652, R. S. of 1901	.06
Prison fund, paragraph 3601, R. S. of 1901	.12
Ranger fund, paragraph 3229, R. S. of 1901	.05
Redemption fund, paragraph 3615, R. S. of 1901	.025
Interest World's Fair bonds, act 103, laws of 1891	.0038
Interest fund, paragraph 2047, organic laws and act of Congress of 1890	.1307
University interest fund, paragraph 3663, R. S. of 1901	.005
Capitol interest fund, act 9, laws of 1897	.0125
Tempe Normal School fund, act 38, sec. 1, laws of 1903	.025
Tempe Normal School building fund, act 38, sec. 4, laws of 1903	.04
University interest fund, act 47, sec. 10, laws of 1903	.0017
Northern Arizona Normal School fund, act 71, sec. 1, laws of 1903	.03
Northern Arizona Normal School fund, act 71, sec. 2, laws of 1903	.01
Territorial Industrial School fund, act 72, sec. 2 (A), laws of 1903	.01
Territorial Industrial School improvement fund, act 72, sec. 2 (B), laws of 1903	.04
Interest St. Louis Exposition bonds, act 86, laws of 1901	.0038
Interest insane asylum bonds, act 73, laws of 1903	.0025
Total	.9500

VALUATION OF TAXABLE PROPERTY.

At the meeting of the board of equalization the following final valuations were placed upon the taxable property of the different counties of the Territory:

SCHEDULE A.—*Final valuations of property in each county in Arizona for 1904.*

APACHE COUNTY.

Property.	Number.	Valuation.	Per cent increased.
Cultivated land ....acres..	2,640	$33,000.00	
Improvements		226,425.25	
Uncultivated land ....acres..	1,000	1,250.00	
Improvements		27,482.62	
Railroad land ....acres..	788,522.37	151,938.02	
Town and city lots	315	14,187.50	
Improvements		48,645.00	
Horses:			
Range	1,575	15,750.00	
Work	500	22,850.00	
Saddle	200	4,015.00	
Stallions	10	750.00	
Mules	60	1,800.00	
Asses	200	1,400.00	
Cattle:			
Range and stock	2,862	34,344.00	
Milch cows	237	5,925.00	
Sheep	69,444	138,888.00	
Goats	1,000	2,000.00	
Swine	80	232.00	
Railroad, standard gauge....miles..	55.482	a 255,509.21	
All other property		58,254.00	
Total		1,044,645.60	

a Estimated.

SCHEDULE A.—*Final valuation of property in each county in Arizona for 1904*—Continued.

COCHISE COUNTY.

Property.	Number.	Valuation.	Per cent increased.
Cultivated land ..... acres..	35,636	$120,468.00	.....
Improvements	.....	42,840.00	.....
Land grants ..... acres..	64,673	143,295.00	.....
Patented mines	565	136,896.00	.....
Improvements on patented mines	.....	753,761.00	.....
Improvements on unpatented mines	.....	72,960.00	.....
Town and city lots	10,470	804,186.00	.....
Improvements	.....	1,216,240.00	.....
Horses:			
Range	1,038	10,760.00	.....
Work	1,049	36,039.00	.....
Saddle	1,356	27,310.00	.....
Stallions	9	615.00	.....
Mules	137	5,060.00	.....
Asses	32	160.00	.....
Cattle:			
Range and stock	29,333	293,945.00	.....
Milch cows	311	7,775.00	0.97
Bulls	334	15,920.00	.....
Sheep	170	390.00	.....
Goats	4,725	10,902.00	.....
Swine	248	800.00	.....
Railroad, standard gauge ..... miles..	253	1,534,166.00	.....
Pullman Company	.....	7,396.00	.....
All other property	.....	1,047,783.49	.....
Merchandise	.....	560,435.00	.....
Total	.....	6,850,132.49	.....

COCONINO COUNTY.

Cultivated land ..... acres..	292,613.13	$340,480.00	.....
Improvements	.....	32,350.00	.....
Railroad land ..... acres..	409,167.04	526,630.48	.....
Patented mines	3	3,240.00	.....
Improvements on patented mines	.....	4,650.00	.....
Improvements on unpatented mines	.....	17,095.00	.....
Town and city lots	.....	153,602.50	.....
Improvements	.....	315,930.00	.....
Horses:			
Range	2,182	21,820.00	.....
Work	831	33,240.00	.....
Saddle	783	19,575.00	.....
Stallions	5	650.00	.....
Mules	45	1,800.00	.....
Asses	232	1,160.00	.....
Cattle:			
Range and stock	17,408	180,172.80	.....
Beef	5	100.00	.....
Milch cows	247	7,410.00	.....
Bulls	27	405.00	.....
Sheep	161,300	324,512.00	.....
Goats	2,006	4,012.00	.....
Swine	135	675.00	.....
Railroad:			
Standard guage ..... miles..	23	34,650.00	.....
Narrow guage ..... do....	131.66	[a] 572,750.00	.....
All other property	.....	643,394.12	.....
Total	.....	3,240,483.90	.....

[a] Estimated.

SCHEDULE A.—*Final valuations of property in each county in Arizona for 1904*—Cont'd.

GILA COUNTY.

Property.	Number.	Valuation.	Per cent increased.
Cultivated land ....acres..	5,186	$17,832.00	
Improvements		5,760.00	
Patented mines	69	138,150.00	
Improvements on patented mines		176,470.00	
Improvements on unpatented mines		77,630.00	
Town and city lots		138,330.00	
Improvements		246,420.00	
Horses:			
Range	1,017	10,170.00	
Work	479	11,975.00	0.16
Saddle	1,287	25,755.00	
Stallions	4	180.00	
Mules	81	2,047.00	
Asses	145	720.00	
Cattle:			
Range and stock	25,059	250,590.00	
Milch cows	132	3,300.00	
Bulls	7	145.00	24.7
Sheep	1,322	2,645.00	
Goats	16,904	33,808.00	
Swine	230	690.00	
Railroad, standard guage....miles..	32.24	88,860.00	
All other property		250,550.00	
Total		1,481,827.00	

GRAHAM COUNTY.

Cultivated land ....acres..	52,616	$482,435.50	
Improvements		416,725.80	
Patented mines	135	432,933.32	
Town and city lots		109,785.00	
Improvements		217,750.00	
Horses:			
Range	989	9,890.00	
Work	1,154	46,160.00	
Saddle	2,185	54,625.00	
Stallions	13	945.00	
Mules	150	6,000.00	
Asses	350	3,500.00	
Cattle:			
Range and stock	39,999	399,990.00	
Milch cows	813	20,325.00	
Bulls	45	1,180.00	
Sheep	40	80.00	
Goats	15,532	31,064.00	
Swine	395	1,185.00	
Railroad, standard guage....miles..	158	552,883.10	
All other property		2,217,976.14	
Total		5,005,432.86	

SCHEDULE A.—*Final valuations of property in each county in Arizona in 1904.*—Cont'd.

MARICOPA COUNTY.

Property.	Number.	Valuation.	Per cent increased.
Cultivated land.....acres..	289,654	$3,560,682.00	.....
Improvements	.....	435,409.00	.....
Patented mines	12	6,000.00	.....
Town and city lots	14,899	2,414,085.00	.....
Improvements	.....	1,765,295.00	.....
Horses:			
Range	1,634	16,340.00	.....
Work	4,243	106,075.00	.....
Saddle	.....	.....	.....
Stallions	20	1,785.00	.....
Ostriches	900	40,000.00	.....
Mules	218	5,450.00	3.21
Asses	8	575.00	.....
Cattle:			
Range and stock	19,267	192,670.00	.....
Calves	2,627	13,135.00	.....
Milch cows	5,203	130,075.00	.....
Bulls	254	6,032.00	.....
Sheep	2,279	4,558.00	.....
Goats	1,406	2,109.00	.....
Swine	3,862	7,724.00	.....
Railroad, standard guage.....miles..	97.59	522,831.76	.....
All other property	.....	1,182,495.24	.....
Total	.....	10,413,326.00	.....

MOHAVE COUNTY.

Cultivated land.....acres..	1,070.50	$3,915.00	.....
Improvements	.....	98,723.50	.....
Railroad land.....acres..	42,445.03	8,489.00	.....
Patented mines.....do....	2,599.54	147,775.00	.....
Improvements on patented mines	.....	119,964.00	.....
Improvements on unpatented mines	.....	26,280.00	.....
Town and city lots	723	36,792.70	.....
Improvements	.....	76,290.00	.....
Horses:			
Range	486	9,720.00	.....
Work	203	10,150.00	.....
Saddle	518	18,130.00	.....
Brood mares	29	595.00	.....
Mules	14	500.00	.....
Asses	53	285.00	.....
Cattle:			
Range and stock	8,288	82,880.00	.....
Milch cows	107	2,675.00	25.00
Bulls	3	75.00	.....
Sheep	5,020	10,060.00	.....
Goats	1,350	2,700.00	.....
Swine	55	275.00	.....
Railroad, standard guage.....miles..	107.881	539,405.00	.....
All other property	.....	116,669.09	.....
Household and kitchen furniture, less widow's exemption, $9,886	.....	6,227.00	.....
Total	.....	1,308,689.29	.....

SCHEDULE A.—*Final valuations of property in each county in Arizona for 1904*—Cont'd.

NAVAJO COUNTY.

Property.	Number.	Valuation.	Per cent increased.
Cultivated land.....acres..	2,879	$33,197.20	.....
Uncultivated land.....do....	9,239	15,748.98	.....
Improvements	.....	8,896.00	.....
Railroad land.....acres..	721,108.57	144,221.71	.....
Land grants.....do....	323,721.89	64,744.18	.....
Improvements	.....	1,000.00	.....
Patented land	37,638.76	94,096.90	.....
Town and city lots	.....	68,226.20	.....
Improvements	.....	146,397.40	.....
Horses:			
Range	1,359	10,599.00	.....
Work	465	16,150.00	.....
Saddle.....	343	7,059.00	.....
Stallions.....	5	450.00	.....
Mules.....	10	320.00	.....
Asses	135	675.00	.....
Cattle:			
Range and stock	3,666	36,660.00	0.04
Milch cows.....	460	11,500.00	25.00
Bulls	5	100.00	.....
Sheep.....	73,460	146,920.00	.....
Goats.....	1,550	3,100.00	.....
Swine	229	985.50	.....
Railroad, standard guage.....miles..	57.155	[a] 263,200.00	.....
All other property.....	.....	188,576.90	.....
Total	.....	1,262,823.97	.....

[a] Estimated.

PIMA COUNTY.

Cultivated land .....acres..	60,089	$241,823.00	.....
Improvements	.....	150,706.00	.....
Land grants.....acres..	17,208	12,906.00	.....
Improvements	.....	2,000.00	.....
Patented mines	188	66,100.00	.....
Improvements on patented mines	.....	2,000.00	.....
Improvements on unpatented mines.....	.....	4,500.00	.....
Town and city lots.....	.....	828,788.00	.....
Improvements	.....	1,338,586.00	.....
Horses:			
Range	1,112	11,625.00	.....
Work	597	14,925.00	25.0
Saddle.....	623	12,460.00	47.4
Stallions.....	18	450.00	.....
Mules	53	1,405.00	.....
Asses	8	40.00	.....
Cattle:			
Range and stock	18,865	188,650.00	83.15
Milch cows.....	265	6,625.00	44.5
Bulls	210	4,200.00	.....
Sheep.....	3,750	7,500.00	.....
Swine	80	240.00	.....
Railroad, standard gauge.....miles..	64.75	454,674.50	.....
Pullman Company	.....	4,428.90	.....
All other property.....	.....	754,741.00	.....
Total	.....	4,109,463.40	.....

SCHEDULE A.—*Final valuations of property in each county in Arizona for 1904*—Cont'd.

PINAL COUNTY.

Property.	Number.	Valuation.	Per cent increased.
Cultivated lands ..... acres..	59,383	$359,467.00	.....
Improvements	.....	92,351.00	.....
Patented mines	41	41,100.00	.....
Improvements on patented mines	.....	2,600.00	.....
Improvements on mill sites on patented mines	16	16,000.00	.....
Town and city lots	1,319	37,030.00	.....
Improvements	.....	62,615.00	.....
Horses:			
Range	1,031	6,715.00	.....
Work	544	14,000.00	.....
Saddle	505	10,100.00	62.6
Mules	74	1,865.00	.....
Asses	53	270.00	.....
Cattle, all kinds	12,105	167,204	.....
Sheep	2,500	5,000.00	.....
Goats	939	1,898.00	.....
Swine	398	1,133.00	.....
Railroad, standard gauge ..... miles..	80.29	478,687,19	.....
Rolling stock	.....	62,973.25	.....
All other property	.....	259,625.96	.....
Total	.....	1,620,634.40	.....

SANTA CRUZ COUNTY.

Cultivated land ..... acres..	11,525	$32,428.00	.....
Improvements	.....	58,491.00	.....
Land grants ..... acres..	45,235	65,614.30	.....
Patented mines	50	68,800.00	.....
Improvements on patented mines	.....	3,700.00	.....
Improvements on unpatented mines	.....	64,625.00	.....
Town and city lots	.....	205,239.00	.....
Improvements	.....	257,690.00	.....
Horses:			
Range	1,266	12,660.00	.....
Work	333	8,655.00	.....
Saddle	553	11,060.00	1
Stallions	14	630.00	.....
Mules	81	2,025.00	.76
Asses	123	384.00	.....
Cattle:			
Range and stock	19,775	197,750.00	.....
Milch cows	63	1,799.00	.....
Bulls	251	4,982.50	.....
Goats	770	905.00	.....
Swine	75	211.00	.....
Railroad, standard gauge ..... miles..	52.4	221,822.00	.....
Shetland ponies	19	220.00	.....
All other property	.....	256,608.03	.....
Total	.....	1,476,298.83	.....

SCHEDULE A.—*Final valuations of property in each county in Arizona for 1904*—Cont'd.

YAVAPAI COUNTY.

Property.	Number.	Valuation.	Per cent increased.
Cultivated land ..... acres..	86,514.38	$179,002.20	.....
Improvements	.....	105,380.00	.....
Railroad lands ..... acres..	210,809.55	45,469.78	.....
Land grants ..... do....	99,445.20	49,722.51	.....
Improvements	.....	3,000.00	.....
Patented mines	1,049	1,029,366.28	.....
Improvements on patented mines	.....	949,614.60	.....
Improvements on unpatented mines	.....	175,287.00	.....
Town and city lots	.....	534,223.50	.....
Improvements	.....	881,105.00	.....
Horses:			
Range	1,734	17,340.00	.....
Work	1,692	47,490.00	.....
Saddle	1,049	26,225.00	13.37
Stallions	11	645.00	.....
Mules	117	2,675.00	.....
Asses	229	.....	.....
Cattle:			
Range and stock	26,618	261,480.00	.....
Beef	.....	15,650.00	.....
Milch cows	624	300.00	.....
Bulls	11	41,060.00	.....
Sheep	20,530	31,203.00	.....
Goats	15,757	1,778.00	.....
Swine	594	264,941.25	.....
Railroads:			
Standard gauge ..... miles..	60.558	109,200.00	.....
Narrow gauge ..... do....	27.3	.....	.....
All other property	.....	1,194,754.67	.....
Total	.....	5,973,083.79	.....

YUMA COUNTY.

Cultivated land ..... acres..	40,134.5	$114,240.50	.....
Improvements	.....	10,050.00	.....
Patented mines	20	8,752.00	.....
Improvements on patented mines	.....	23,730.00	.....
Improvements on unpatented mines	.....	20,571.50	.....
Town and city lots	764	194,543.50	.....
Improvements	.....	100,758.00	.....
Horses:			
Range	268	2,975.00	.....
Work	883	22,100.00	.....
Saddle	64	1,300.00	.....
Stallions	5	230.00	.....
Mules	92	2,300.00	0.088
Cattle:			
Range and stock	1,871	20,581.00	.....
Milch cows	290	7,250.00	25
Bulls	6	127.00	.....
Swine	1,356	4,065.00	.....
Railroad, standard gauge ..... miles..	82.5	579,314.99	.....
Pullman Company	.....	5,643.00	.....
All other property	.....	144,172.30	.....
Total	.....	1,282,703.79	.....

SCHEDULE B.—*Final valuation placed on railroad property for the year 1904.*

Name of company.	Number miles.	Rate per mile.	Valuation.
Southern Pacific	392.5	$7,022.00	$2,756,135.00
El Paso and Southwestern	96	6,750.00	648,000.00
Maricopa and S. R. V. R. R.	34.88	4,970.48	173,370.22
Arizona and New Mexico	40	5,504.50	220,180.00
New Mexico and Arizona	87.8	4,249.81	373,133.00
Morenci Southern	18	3,752.78	67,550.00
Central Arizona	11	2,000.00	22,000.00
Saginaw and Manistee Lumber Company	12	1,054.16⅔	12,650.00
Gila Valley Globe and Northern	124.3	2,750.00	341,825.00
United Verde	27.3	4,000.00	109,200.00
Total	843.78		4,724,043.22
Pullman Company			80,059.74
Atchison, Topeka and Santa Fe	386.734		1,873,246.25
Total			6,677,349.21

SCHEDULE C.—*Total valuation, by counties, for the year 1904.*

County.	Valuation.
Apache	$1,044,645.60
Cochise	6,850,132.49
Coconino	3,240,483.90
Gila	1,481,827.00
Graham	5,005,432.86
Maricopa	10,413,326.00
Mohave	1,308,689.29
Navajo	1,262,823.97
Pima	4,109,463.40
Pinal	1,620,634.40
Santa Cruz	1,476,298.83
Yavapai	5,973,083.79
Yuma	1,282,703.79
Total	45,069,545.32

SCHEDULE D.—*Statement of the aggregate amount of each object of taxation in the Territory for the year 1904.*

950,179.51 acres of cultivated and uncultivated land	$5,535,969.38
2,735,573.95 acres land grants and railroad lands	1,454,902.88
Improvements on lands	1,711,590.17
Improvements on land grants, etc	6,000.00
2,132 patented mines	1,931,517.60
Improvements, patented and unpatented mines	2,511,438.10
Town and city lots	5,539,018.90
Improvements	6,673,721.40
523,766 horses	772,052.00
900 ostriches	40,000.00
1,482 mules	36,747.00
1,218 asses	7,140.00
237,698 cattle	2,578,627.30
339,815 sheep	681,613.00
65,689 goats	123,701.00
7,736 swine	19,993.50
Value of railroad property	6,677,349.21
All other property	8,778,049.88
Total	45,079,431.32
Less widows' exemptions	9,886.00
Total value taxable property	45,069,545.32

Mileage of railways.

The roads now in operation in the Territory are as follows:

	Gauge.	Miles.
	Feet.	
Southern Pacific of Arizona, extending along the southern part of the Territory from Yuma, on the Colorado River, to the eastern boundary of Cochise County, passing through the counties of Yuma, Maricopa, Pinal, Pima, and Cochise	4. 8½	383
Santa Fe Pacific, crossing north of the center of the Territory, near the thirty-fifth parallel, and passing through the counties of Apache, Navajo, Coconino, Yavapai, and Mohave	4. 8½	393
Santa Fe, Prescott and Phoenix, running from Ash Fork, on the line of the Santa Fe Pacific, through the counties of Yavapai and Maricopa, to Phoenix	4. 8½	197
Gila Valley, Globe and Northern, running from Bowie, on the Southern Pacific, in Cochise County, to Globe, Gila County	4. 8½	140
New Mexico and Arizona, running from Benson, on the Southern Pacific, in Cochise County, to Nogales, in the same county, at the Mexican line	4. 8½	87
Arizona and New Mexico, running from Clifton, in Graham County, to the Southern Pacific at Lordsburg, N. Mex	4. 8½	71
Arizona and Southeastern, running from Bisbee, Cochise County, to Benson, on the Southern Pacific, in the same county	4. 8½	54
Maricopa and Phoenix and Salt River Valley, running from Maricopa, Pinal County, on the Southern Pacific, to Phoenix, Maricopa County, with a branch from Tempe, Maricopa County, to Mesa, in the same county	4. 8½	43
Prescott and Eastern, running from a point on the Santa Fe, Prescott and Phoenix, Yavapai County, to Mayer, in the same county	4. 8½	27
United Verde and Pacific, running from Jerome Junction, on line of Santa Fe, Prescott and Phoenix Railway, to Jerome Junction, Yavapai County	3	26
Congress Gold Company, running from Congress Junction, on the Santa Fe, Prescott and Phoenix, in Yavapai County, to the Congress mine	4. 8½	4
Arizona and Utah, running from McConnico Junction, on the Santa Fe Pacific, in Mohave County, to Chloride, in the same county	4. 8½	23
The Southeastern, from Don Louis Station, on the Arizona and Southeastern Railway, to Douglas, on the boundary line between Mexico and the United States	4. 8½	22½
A branch of the Arizona and Southeastern, from Don Louis Station to Naco	4. 8½	6
The Morenci Southern, from Guthrie, on the Arizona and New Mexico, to Morenci	3	18
The Santa Fe and Grand Canyon, from Williams, on the Santa Fe, to the Grand Canyon of the Colorado	4. 8½	64
El Paso and Southwestern, entering Arizona at the eastern border of Cochise County and passing southwest to Bisbee and Naco	4. 8½	156⅜
Arizona and Colorado	4. 8½	18
Tombstone branch of the El Paso and Southwestern, running from Fairbank to Tombstone, in Cochise County	4. 8½	9 3/10
Phoenix and Eastern, running from Phoenix to Mesa, Florence, and Kelvin	4. 8½	81
Bradshaw Mountain, running from Mayer to Crown King, in Yavapai County	4. 8½	28
Arizona Southern, running from Red Rock, on the Southern Pacific, to Silverbell	4. 8½	22

SETTLEMENT OF LANDS.

There are two land districts in this Territory, one with headquarters at Tucson, comprising the counties of Pima, Yuma, Maricopa, Pinal, Santa Cruz, Graham, Cochise, and Gila; the other at Prescott, comprising the counties of Yavapai, Mohave, Coconino, Navajo, and Apache. The Tucson land district contains 45,318 square miles and the Prescott district 68,000. Following are the reports submitted by the registers of the two districts showing the business transacted during the fiscal year ended June 30, 1904:

Statement of the business transacted at the Tucson, Ariz., land office for the fiscal year ending June 30, 1904.

Class of entry.	Number.	Acres.	Commissions.	Fees.	Amount.
Sales of mineral lands	71	6,325.598	.....	.....	$26,930.00
Sales of abandoned military reservations	3	276.87	.....	.....	696.08
Excess payments on homesteads and other entries	43	122.77	.....	.....	153.46
Original entries under desert-land act	32	5,074.27	.....	.....	1,268.56
Final entries under desert-land act	12	1,952.63	.....	.....	1,952.63
Homestead entries commuted to cash entries under section 2301, Revised Statutes	56	8,422.67	.....	.....	10,528.34
Total cash sales	217	22,174.808	.....	.....	41,529.07
Original homestead entries	382	52,279.97	$1,954.50	$3,425.00	5,379.50
Final homestead entries	74	9,744.36	365.44	.....	365.44
Final timber-culture entries	2	320	.....	8.00	8.00
Applications to purchase mineral lands	85	.....	.....	850.00	850.00
Mineral protests, adverse claims	15	.....	.....	150.00	150.00
Indian scrip location	1	40	.....	.....	.....
Valentine scrip filings	2	80	.....	2.00	2.00
Valentine scrip location	1	40	.....	1.00	1.00
Soldiers' and sailors' homestead declaratory statements	2	320.29	.....	6.00	6.00
State selections	2	320	.....	4.00	4.00
Amount received for cancellation notices	.....	.....	.....	24.00	24.00
Amount received for reducing testimony to writing	.....	.....	.....	1,044.42	1,044.42
Total of all classes of entries and amount received therefrom	783	85,319.428	2,319.94	5,514.42	49,363.43

Tucson, Ariz., land district, July 1, 1904.

Name of county.	Area in acres unappropriated and unreserved.			Area in acres reserved.	Area in acres appropriated.	Total area of land surface of the county in land district.	Brief description of character of unappropriated and unreserved land.
	Surveyed.	Unsurveyed.	Total.				
Apache	21,206	18,009	39,215	205,140	2,645	247,000	Mountainous.
Cochise	1,611,271	1,733,012	3,344,283	302,199	335,518	3,982,000	Mountainous, grazing, arid.
Gila	13,094	81,648	94,742	1,081,861	34,897	1,211,500	Do.
Graham	822,983	1,908,444	2,731,427	1,130,000	276,573	4,138,000	Do.
Maricopa	1,033,608	2,292,774	3,326,382	563,571	536,047	4,426,000	Grazing and arid.
Navajo	.....	.....	.....	70,000	.....	70,000	No vacant public land.
Pima	994,095	4,138,879	5,132,974	578,594	455,932	6,167,500	Mountainous, arid, grazing.
Pinal	467,756	2,079,795	2,547,551	684,328	242,621	3,474,500	Do.
Santa Cruz	247,938	298,574	546,512	222,917	30,071	799,500	Do.
Yuma	622,618	3,838,650	4,461,268	95,094	375,638	4,932,000	Do.
Total	5,834,569	16,389,785	22,224,354	4,933,704	2,289,942	29,448,000	

Statement of the business transacted at the Prescott, Ariz., land office for the fiscal year ending June 30, 1904.

Name of county.	Area in acres unappropriated and unreserved.			Area in acres reserved.	Area in acres appropriated.	Total area of land surface of the county in land district.	Brief description of character of unappropriated and unreserved lands.
	Surveyed.	Unsurveyed.	Total.				
Apache	1,010,228	690,157	1,700,385	3,977,886	1,233,729	6,912,000	Mountainous, arid, grazing, timber.
Coconino	1,915,515	2,902,355	4,817,870	6,440,545	434,585	11,693,000	Mountainous, grazing, farming.
Gila	51,275	1,216,243	1,321,023	392,619	4,358	1,718,000	Arid, broken.
Maricopa	153,295	7,391,932	1,369,538	1,446	4,016	1,375,000	Do.
Mohave	983,273	643,820	8,375,005	384,790	49,005	8,809,000	Do.
Navajo	1,268,581	3,238,928	1,912,401	3,395,820	1,012,599	5,320,820	Do.
Yavapai	848,057	1,193,837	4,086,980	520,770	513,250	5,121,000	Mountainous, timber, grazing.
Yuma	.....	.....	1,193,837	201,600	63	1,395,500	Arid, grazing, broken.
Total	6,230,224	18,547,015	24,777,039	15,315,476	3,251,605	43,344,320	

Schedule of the business transabted at the Prescott, Ariz., land office for the fiscal year endiny June 30, 1904—Continued.

	Number.	Acres.
ORIGINAL ENTRIES.		
Homestead entries	71	9,841
Desert land		
Mineral applications	70	10,643
Indian allotments		
Declaratory statements	2	320
Total	143	20,804
FINAL ENTRIES.		
Homestead	53	8,172
Commuted cash, including excess	8	461
Desert land		
Mineral entries	57	3,950
Railroad selections	7	156,218
Total		168,801

CUSTOMS.

Trade relations with Mexico show a marked increase, the value of imports being $7,735,586, as reported by the collector of customs at Nogales, Ariz. The domestic exports were $5,139,412, and the foreign exports $32,765.

INTERNAL REVENUE.

Arizona is included in the district of New Mexico, the two Territories being under the supervision of one collector of internal revenue with headquarters at Santa Fe, N. Mex. A deputy collector is appointed who has charge of the collections in this Territory. The collections in Arizona from this source during the past fiscal year were as follows:

Special-tax stamps	$31,959.98
List, covers penalties and compromises for violations of law	1,012.07
Documentary stamps	5.00
Beer stamps	855.00
Tobacco stamps	999.00
Cigar stamps	7,658.19
Total	42,489.24

PROCLAMATIONS.

During the fiscal year the following proclamations were issued by the governor:

Proclamation issued August 24, 1903, designating September 7, 1903, as Labor Day.

Proclamation issued November 6, 1903, designating Thursday, November 26, 1903, to be observed as Thanksgiving Day.

Proclamation issued February 4, 1904, setting apart February 5, 1904, as Arbor Day for the counties of Maricopa, Pima, Pinal, Yuma, Graham, Gila, Santa Cruz, and Cochise, and April 8, 1904, as Arbor Day for the counties of Apache, Navajo, Coconino, Mohave, and Yavapai.

Proclamation issued May 26, 1904, closing all Territorial offices on May 27, 1904, in respect to the memory of Hon. Thomas W. Pemberton, ex-Territorial treasurer.

Proclamations to restore citizenship, 9; absolute pardons, 5; paroles, 9; extradition requests made by other States, 14; extradition requests made to other States, 12.

Number of notaries public appointed, 161; commissioners of deeds, 4.

PRECIPITATION OF RAIN AND SNOW.

To a large extent the snowfall of the winter months is depended upon to furnish irrigation water. The snows of the winter of 1903–4 were, however, so light that they did not affect the flow of water in streams to any considerable extent. Following is a comparative table showing the amount of snowfall at selected stations during November, December, January, February, and March for the past three years:

Snowfall in inches.

NOVEMBER.

	1901.	1902.	1903.
Flagstaff	Trace.	58.2	0
Fort Huachuca	0	.....	0
Natural Bridge	0	6.0	0
Oracle	0	0	0
Pinal Ranch	0	2.0	0
Prescott	0	17.0	0
Taylor	0	0	0
Yarnell	0	10.0	0

DECEMBER.

Flagstaff	1.0	16.9	1.0
Fort Huachuca	0.1	1.0	0
Natural Bridge	0	3.0	0
Oracle	0	2.0	0
Pinal Ranch	1.0	.....	0
Prescott	0	2.2	0
Taylor	2.5	0	Trace.
Yarnell	0	1.5	0

JANUARY.

	1902.	1903.	1904.
Flagstaff	32.3	4.5	6.9
Fort Huachuca	0.5	0.4	1.0
Natural Bridge	12.0	0.5	6.0
Oracle	7.0	0	1.5
Pinal Ranch	14.2	0	3.5
Prescott	22.0	4.0	3.5
Taylor	11.0	1.1	1.1
Yarnell	8.0	0	2.0

FEBRUARY.

Flagstaff	13.1	25.4	4.7
Fort Huachuca	0	9.5	1.2
Natural Bridge	0	27.0	5.0
Oracle	0	13.0	6.0
Pinal Ranch	0	.....	5.0
Prescott	Trace.	14.0	3.0
Taylor	1.0	24.0	5.7
Yarnell	Trace.	5.0	2.5

MARCH.

Flagstaff	25.9	25.3	13.1
Fort Huachuca	0.2	0	0
Natural Bridge	6.0	0	0
Oracle	8.5	0	0
Pinal Ranch	8.5	0	0
Prescott	15.0	Trace.	4.0
Taylor	1.0	0	0
Yarnell	11.0	0	0

Average annual precipitation for stations in Arizona for the period 1859–1903.

Stations.	Latitude.	Longitude.	Elevation.	Record.		Years (inclusive).	Average annual precipitation.
				From—	To—		
	° ′	° ′	*Feet.*				
Flagstaff	35 12	111 37	6,907	1888	1903	7	24.69
Fort Apache	33 40	109 45	5,600	1872	1903	28	18.38
Fort Bowie	32 08	109 23	4,781	1867	1894	25	14.95
Fort Defiance	35 43	109 10	6,500	1889	1903	14	13.49
Fort Grant	32 36	109 53	4,780	1866	1903	31	14.40
Fort Huachuca	31 20	110 20	4,785	1886	1903	18	15.63
Fort Mohave	35 02	114 36	600	1859	1901	24	5.62
Gila Bend	32 59	112 46	737	1890	1901	11	5.05
Holbrook	34 55	110 10	5,047	1887	1900	13	8.06
Maricopa	33 08	112 02	1,190	1875	1903	23	5.37
Natural Bridge	34 26	111 34	4,999	1890	1903	14	20.29
Phoenix	33 28	112 00	1,108	1876	1903	20	6.90
Prescott	34 33	112 28	5,318	1865	1903	32	15.32
San Carlos	33 16	110 27	3,456	1881	1901	20	11.95
Signal	34 22	113 35	1,652	1889	1902	13	6.95
Texas Hill	32 48	113 40	355	1879	1900	17	3.17
Tucson	32 14	110 54	2,404	1867	1903	36	11.22
Williams	35 10	112 02	6,700	1888	1899	6	16.31
Yuma	32 44	114 36	141	1875	1903	27	2.77

Summary of school statistics.

School census and attendance.	1903.	1904.
Children between 6 and 21 years of age	25,951	27,324
Children between 8 and 14 years of age	13,311	14,461
Children enrolled in the public schools	20,008	21,366
Average daily attendance	12,105	13,239
Percentage of school population enrolled	77	78
Percentage of enrollment in daily attendance	60	61
SCHOOLS.		
High schools under special law	2	3
Grammar schools	131	147
Primary schools	333	351
Kindergarten schools	1	1
School districts	276	287
New districts organized	19	23
New schoolhouses built	11	20
TEACHERS.		
Men teachers employed	121	110
Women teachers employed	361	409
Number holding first-grade certificates	103	198
Number holding second-grade certificates	128	180
Number holding life diplomas	21	24
Number holding educational diplomas	37	45
Number holding Arizona normal diplomas	43	72
Average salary paid men teachers	$80.00	$81.05
Average salary paid women teachers	$67.81	$69.59
DIPLOMAS AND CERTIFICATES ISSUED.		
Life diplomas issued during the year (1904)	.....	1
Educational diplomas issued	.....	8
First-grade certificates issued	.....	138
Second-grade certificates issued	.....	106
MISCELLANEOUS.		
Days school was in session	125	130
Volumes in school libraries	15,566	16,819
Valuation of school property	$783,735	$882,790

Financial summary.

	1903.	1904.
RECEIPTS.		
Balance on hand June 30, 1902	$115,239.82	$88,468.19
Received from Territorial taxes	25,761.02	32,438.75
Received from county taxes	221,458.28	216,589.03
Received from school taxes	27,659.68	54,461.95
Received from special district taxes	19,664.10	13,130.69
Received from licenses, fines, and other sources	65,526.49	65,194.10
Received from sale of bonds and in interest	25,223.78	65,870.87
Received from miscellaneous sources	927.09	19,705.84
Total receipts	501,460.26	555,859.42
DISBURSEMENTS.		
Paid for teachers' salaries	242,848.42	256,713.66
Paid for fuel, repairs, and contingent expenses	70,575.06	73,054.76
Paid for school libraries	433.41	477.03
Paid for apparatus	2,470.10	899.60
Paid for buildings and furniture	60,296.71	55,539.04
Paid for supervision and miscellaneous purposes	17,491.96	32,301.21
Paid in interest on bonds	20,024.61	19,843.00
Total disbursements	414,140.27	438,828.30
SUPERVISION AND MISCELLANEOUS.		
Territorial:		
Salary of superintendent of public instruction	1,800.00	1,800.00
Salary of board of examiners	600.00	600.00
Printing, postage, and contingent expenses	958.53	568.00
County:		
Salaries of county superintendents and miscellaneous expenses	12,646.60	32,301.21
Total	15,905.13	35,269.21
The deaf and dumb and the blind:		
California institution at Berkeley	2,025.00	1,025.00
Utah institution at Ogden	312.50	375.00
Total	2,337.50	1,400.00

ROSTER OF TERRITORIAL OFFICERS.

(Appointed by the President.)

EXECUTIVE DEPARTMENT.

Governor, Col. Alexander O. Brodie, Yavapai County; secretary of the Territory, Hon. W. F. Nichols, Cochise County.

JUDICIARY DEPARTMENT.

Supreme court: Hon. Edward Kent, chief justice, Phoenix; Hon. George R. Davis, associate justice, Tucson; Hon. Fletcher M. Doan, associate justice, Florence; Hon. Richard E. Sloan, associate justice, Prescott.

District court, first judicial district (comprising the counties of Pima, Yuma, and Santa Cruz): Judge, George R. Davis.

District court, second judicial district (comprising the counties of Pinal, Cochise, and Graham): Judge, Fletcher M. Doan.

District court, third judicial district (comprising the counties of Maricopa and Gila): Judge, Edward Kent.

District court, fourth judicial district (comprising counties of Yavapai, Mohave, Coconino, Apache, and Navajo): Judge, Richard E. Sloan.

United States district attorney: Hon. Frederick L. Nave, Nogales; assistant United States district attorney, Hon. John A. Campbell, Tucson.

United States marshal: Col. Myron H. McCord, Phoenix.

United States internal-revenue collector for Arizona and New Mexico: Hon. A. L. Morrison, Santa Fe, N. Mex.

United States land office, Prescott: Register, Fen. S. Hildreth, Prescott; receiver, J. M. W. Moore, Prescott.

United States land office, Tucson: Register, M. W. Moore, Tucson; receiver, John H. Bauman, Tucson.

United States surveyor-general: Hon. F. S. Ingalls, Yuma.

United States collector of customs: Edwin Baker, Nogales.

(Appointed by the governor.)

Attorney-general, Hon. Ed. W. Wells, Prescott; territorial auditor and bank comptroller, Hon. Isaac M. Christy, Phoenix; Territorial treasurer, Hon. E. E. Kirkland, Kirkland; superintendent of public instruction, Hon. Nelson G. Layton, Flagstaff; adjutant-general, Maj. B. W. Leavell, U. S. Army, Prescott; board of control, Col. Alexander O. Brodie, governor, chairman; Hon. Isaac M. Christy, auditor, member; Hon. George E. Truman, citizen member and secretary; private secretary to the governor, George H. Smalley, Tucson; assistant secretary of the Territory, Lew W. Collins, Phoenix.

Board of equalization: Hon. Isaac M. Christy, Territorial auditor, chairman; for the first judicial district, Hon. Alfred S. Donau, Tucson; for the second judicial district, Hon. George A. Olney, Safford; for the third judicial district, Hon. Frank Parker, Phoenix; for the fourth judicial district, Hon. Fred. W. Nelson, Winslow.

Territorial board of education: Col. Alexander O. Brodie, governor, chairman; Hon. Nelson G. Layton, superintendent of public instruction, secretary; Hon. Isaac M. Christy, Territorial treasurer; Dr. Kendric C. Babcock, president of the University of Arizona; Prof. A. J. Matthews, principal of the Tempe normal school; Prof. A. N. Taylor, principal of the northern Arizona normal school at Flagstaff.

Board of regents, University of Arizona: Chaplain Winfield Scott, U. S. Army, retired, president of the board of regents and chancellor of the university; George J. Roskruge, Tucson, secretary; J. M. Ormsby, Tucson, treasurer; Col. M. J. Egan, Clifton; the governor and superintendent of public instruction ex officio members.

Loan commission: Col. Alexander O. Brodie, governor, chairman; Hon. W. F. Nichols, secretary of Arizona; Hon. Isaac M. Christy, Territorial auditor.

Territorial board of health: Col. Alexander O. Brodie, governor, president; Hon. Ed. W. Wells, attorney-general, vice-president; R. M. Dodsworth, M. D., superintendent of public health and secretary of the board.

Board of education of the Territorial normal school at Tempe: Nelson G. Layton, superintendent of public instruction, Phoenix; Alfred J. Peters, Tempe; Frank L. Drew, Tempe.

Board of education of the Territorial normal school at Flagstaff; Nelson G. Layton, superintendent of public instruction, Phoenix; A. A. Dutton, Flagstaff; C. O. Robinson, Flagstaff.

Territorial prison: Superintendent, Col. William M. Griffith, Tucson.

Territorial insane asylum: Superintendent, Dr. W. H. Ward, Phoenix.

Live-stock sanitary board: Hon. W. S. Sturges, Arivaca, chairman; Hon. J. J. Riggs, Dos Cabezas; Hon. C. T. Hirst, Phoenix.

Territorial veterinarian: Dr. J. C. Norton, Phoenix.

Fish and game commissioners: T. S. Bunch, Safford; Eugene Allison, Jerome; W. L. Pinney, Phoenix.

Board of dental examiners: William G. Lentz, Phoenix; Ralph G. Roper, Prescott; J. L. Hamilton, Phoenix; Edward H. Stiles, Tucson; Frank M. Metzgar, Prescott.

Board of medical examiners: Dr. C. W. Woods, Jerome; Dr. Ancil Martin, Phoenix; Dr. William Duffield, Phoenix; Dr. H. W. Fenner, Tucson; Dr. William L. Woodruff, Troy.

Board of trustees, Territorial industrial school: A. H. Emanuel, Tombstone, chairman; Henry Buehman, Tucson, secretary; Ben Heney, Fairbank.

Superintendent of the Territorial industrial school, F. R. O'Brien, Tombstone.

Commission for the promotion of uniformity of legislation in the United States: Hon. Edward Kent, Phoenix; Hon. E. E. Ellenwood, Prescott; Hon. George R. Davis, Tucson.

Board curators of the Territorial library: Hon. Edward Kent, Phoenix; Hon. J. H. Kibbey, Phoenix; Hon. T. T. Powers, Phoenix.

Board of pharmacy: T. L. McCutchen, Clifton; A. G. Hulet, Phoenix; C. A. Cover, Williams; Fred Fleishman, Tucson; Harry Brisley, Prescott; W. H. Butler, Globe; E. S. Wakelin, Phoenix.

Arizona Rangers: Thomas H. Rynning, Douglas, captain; John J. Brooks, Douglas, lieutenant; A. R. MacDonald, William Sparks, Harry C. Wheeler, Frank S. Wheeler, sergeants.

Board of managers for Arizona at the international exposition to be held at St. Louis, 1903: Hon. R. N. Leatherwood (first judicial district), Tucson; Hon. B. A. Packard (second judicial district), Bisbee; Hon. H. B. St. Claire (third judicial district), Phoenix; Hon. A. J. Doran (fourth judicial district), Prescott.

Honorary members of the board of managers for Arizona at the international exposition to be held at St. Louis, 1903:

Yavapai County: Frank L. Wright, Prescott; A. A. Johns, Prescott; Mrs. Frances W. Munds, Prescott; Mrs. J. C. Martin, Prescott.

Maricopa County: Gates M. Fowler, Phoenix; D. L. Murray, Wickenburg; Henrietta H. Talbot, Phoenix; Vivea C. Kingsbury, Tempe.

Yuma County: Eugene F. Sanguinetti, Yuma; Mulford Winsor, Yuma; Mrs. Elizabeth S. Brown, Yuma; Mrs. Lee R. Patterson, Yuma.

Pinal County: Fred E. White, Florence; W. A. Weeks, Troy; Mrs. J. G. Keating, Florence; Mrs. F. M. Doan, Florence.

Apache County: J. S. Hubbell, St. Johns; J. T. Lesueur, St. Johns; Mrs. Josephine Schuster, St. Johns; Margaret E. Patterson, St. Johns.

Navajo County: J. H. Frisby, Snowflake; V. E. Butner, Winslow; Mrs. Annie M. Flinn, Winslow; Mrs. J. F. Mahoney, Winslow.

Coconino County: F. W. Sisson, Flagstaff; David Babbitt, Flagstaff; Mrs. Ellen Young, Williams; Mrs. E. L. Renoe, Flagstaff.

Mohave County: H. H. Watkins, Kingman; J. P. Finnegan, Chloride; Mrs. Charles Metcalf, Kingman; Mr. John Wesley Emerson, Kingman.

Cochise County: John Brockman, Pearce; B. A. Sneed, Naco; Mrs. H. A. Morgan, Willcox; Annie M. Dyer, Bisbee.

Graham County: A. T. Thomson, Clifton; Charles L. Rawlins, Solomonsville; Mrs. Emma V. Pickett, Morenci; Mrs. W. T. Webb, Pima.

Gila County: N. S. Berray, Globe; John C. Evans, Globe; Mrs. Sarah S. Martin, Globe; Mrs. J. B. Henry, Globe.

Pima County: L. W. Wakefield, Tucson; Barron M. Jacobs, Tucson; Mrs. John A. Black, Tucson; Mrs. Mary Bernard Aguirre, Tucson.

Santa Cruz County: W. F. Overton, Nogales; H. K. Chenoweth, Nogales; Mrs. James A. Harrison, Nogales; Mrs. Arthur E. Crepin, Patagonia.

(Elected.)

Delegate to Congress: Hon. J. F. Wilson, Prescott.

Secretaries and clerks of various boards: Assistant superintendent Territorial prison, U. G. Wilder, Yuma; secretary and storekeeper of the Territorial prison, Walter T. Gregory, Yuma; secretary of the live-stock sanitary board, H. Harrison, Phoenix; auditor's clerk and secretary of the board of equalization, Wesley A. Hill, Phoenix.

MEMBERS OF THE TWENTY-SECOND LEGISLATIVE ASSEMBLY.

Council.—Heber Jarvis, Eagar, Apache County; B. A. Packard, Bisbee, Cochise County; Henry F. Ashurst, Williams, Coconino County; A. H. Morehead, Globe, Gila County; H. B. Rice, Morenci, Graham County; J. H. Kibbey, Phoenix, Maricopa County; J. R. Whiteside, Chloride, Mohave County; J. X. Woods, Winslow, Navajo County; Joe B. Corbett, Tucson, Pima and Santa Cruz counties; E. W. Childs, Mammoth, Pinal County; J. W. Burson, Constellation, Yavapai County; Eugene S. Ives, Yuma, Yuma County.

House of representatives.—N. Gonzales, Springerville, Apache County; Steve Roemer, Benson, Cochise County; James A. Howell, San Bernardino, Cochise County; J. M. O'Connell, Bisbee, Cochise County; John H. Page, Grand View, Coconino County; Joseph B. Henry, Globe, Gila County; W. T. Webb, Pima, Graham County; Gus Williams, Clifton, Graham County; J. D. Marlar, Phoenix, Maricopa County; J. W. Woolf, Tempe, Maricopa County; G. U. Collins, Phoenix, Maricopa County (died January 1, 1904; no successor elected); T. T. Powers, Phoenix, Maricopa County; Kean St. Charles, Kingman, Mohave County; W. A. Parr, Winslow, Navajo County; L. O. Cowan, Tucson, Pima County; M. Lamont, Tucson, Pima County; N. W. Bernard, Tucson, Pima County; P. A. Schilling, Ray, Pinal County; L. C. Herr, Florence, Pinal County; B. J. Whiteside, Nogales, Santa Cruz County; Lucius R. Barrow, Prescott, Yavapai County; T. J. Morrison, Jerome, Yavapai County; W. A. Rowe, Walker, Yavapai County; F. S. Ingalls, Yuma, Yuma County (resigned October 22, 1903; Sanford E. Beach elected to succeed).

OFFICERS OF THE TWENTY-SECOND LEGISLATIVE ASSEMBLY.

Council.—President, Eugene S. Ives, Yuma; chief clerk, John C. Evans, Globe; enrolling and engrossing clerk, A. M. Foster, Yuma; watchman, Pedro G. de la Lama, Phoenix; messenger, Mark L. Dunbar, Phoenix; chaplain, E. A. Penick, Phoenix.

House of representatives.—Speaker, T. T. Powers, Phoenix; chief clerk, C. W. Miller, Tempe; enrolling and engrossing clerk, Geo. W. Shute, Globe; sergeant-at-arms, Thos. Hamilton, Santa Cruz; watchman, Juan B. Giron, Yavapai; messenger, Alfred A. Trippel, Tucson; chaplain, L. J. Hedgpeth, Phoenix.

COUNTY OFFICIALS.

Apache County.—Board of supervisors: A. L. Truax, chairman; Benigno Lopez, Isaac Isaacson; J. R. Armijo, clerk. Probate judge, Capt. John T. Hogue; treasurer, Leandro Ortega; sheriff, Sylvester Peralta; recorder, J. R. Armijo; district attorney, Reamer Ling.

Cochise County.—Board of supervisors: J. J. Bowen, chairman; William Pritchett, Thomas R. York; John N. Gaines, clerk. Probate judge, F. R. O'Brien; recorder, Frank Hare; treasurer and tax collector, M. D. Scribner; district attorney, Seth Leavenworth; assessor, B. J. O'Reilly; school superintendent, C. A. Wallace; surveyor, George C. Clark; sheriff, A. V. Lewis.

Coconino County.—Board of supervisors: George Babbitt, chairman; A. T. Cornish, G. W. Martin; T. A. Flynn, clerk. Probate judge, A. E. Douglass; superintendent of schools, Harrison Conrad; sheriff, James A. Johnson; undersheriff, Robert J. Walker; district attorney, Edward M. Dowe; recorder, Harry C. Hibben; treasurer, Thomas Devine; surveyor, James A. Lamport. Precinct officers: Justice of the peace, Larry W. Quinlan; constable, William C. Bayless; school trustees, P. R. Weatherford, T. J. Coalter, J. W. Francis.

Gila County.—Board of supervisors: Lyman C. Woods, chairman; David Devore, J. G. Oldfield; C. T. Martin, clerk. Treasurer, H. H. Hitchcock; recorder, W. D. Fisk; district attorney, George R. Hill; sheriff, C. R. Rogers; justice of the peace, C. C. Curico; surveyor, Alex. Pendleton; constable at Globe, Andy Mayr.

Graham County.—Board of supervisors: Eugene Caruthers, chairman; Henry Hill, Ira Harper; Arturo M. Elias, clerk. Probate judge, P. C. Little; district attorney, C. L. Rawlins; sheriff, James V. Parks; treasurer, George B. Gamble; assessor, John J. Birdno; recorder, Mit Simms; surveyor, Harry Whittiker; school superintendent, William A. Moody.

Maricopa County.—Board of supervisors: F. C. Norris, chairman; Alexander Hunsaker, Jacob Miller; Neri Osborn, clerk. Sheriff, W. W. Cook; treasurer, J. Elliott Walker; recorder, B. Frank McFall; probate judge, J. C. Phillips; clerk probate court, George Kirkland; district attorney, A. C. Baker; assistant district attorney, Geo. Purdy Bullard; assessor, Frank Luke; superintendent of schools, A. H. Fulton; surveyor, George R. Sturdevant.

Mohave County.—Board of supervisors: J. H. Johnson, chairman; John S. Kolar, William Grant. Probate judge and superintendent of schools, J. A. Logan; recorder and clerk of the board of supervisors, John P. Feeny; treasurer and tax collector, Foster S. Dennis; district attorney, H. L. Dickson; sheriff and assessor, Henry Lovin.

Navajo County.—Board of supervisors: L. E. Divelbess, chairman; R. C. Creswell, F. F. Flickinger. Probate judge, F. J. Wattron; district attorney, T. F. Moran; sheriff, C. I. Houck; treasurer, F. M. Zuck; recorder and clerk board of supervisors, A. F. McAllister. (No county surveyor qualified.)

Pinal County.—Board of supervisors: George J. Acton, chairman; J. F. Mahew, J. G. Keating. Probate judge and school superintendent, John C. Harris; treasurer and tax collector, Albert F. Barker; recorder and clerk board of supervisors, Thomas G. Peyton; district attorney, J. E. O'Connor; sheriff and assessor, Thomas N. Wills.

Pima County.—Board of supervisors: Ed. L. Vail, chairman; C. H. Bayless, Fred Ronstadt; John Mets, clerk. Probate judge, W. J. Kirkpatrick; recorder, Charles Shibell; sheriff, Frank Murphy; district attorney, Roscoe Dale; surveyor, Homer Santee; assessor, Lyman Wakefield; superintendent of schools, William Angus; road overseer, Nat Fullman; justices of the peace, William H. Culver and O. T. Richey; constables, Nabor Pacheco and Jack Dufton.

Santa Cruz County.—Board of supervisors: J. A. Harrison, H. Harmon, Richard Farrell. Sheriff, T. J. Turner; district attorney, F. J. Duffy; treasurer, G. B. Marsh; recorder, Phil Herold; probate judge, W. A. O'Connor; surveyor, C. E. Perkins.

Yavapai County.—Board of supervisors: G. H. Schuerman, chairman; D. G. Sinclair, Fred Stephens; J. H. Robinson, clerk. Sheriff, Jos. I. Roberts; treasurer and tax collector, J. P. Storm; probate judge, C. P. Hicks; recorder, P. J. Farley; district attorney, E. S. Clark; school superintendent, J. B. Jolly; assessor, D. J. Sullivan.

Yuma County.—Board of supervisors: S. B. Hinds, chairman; M. J. Nugent, W. E. Marvin; C. P. Cronin, clerk. Probate judge and superintendent of schools, D. L. DeVane; sheriff, Gus Livingston; undersheriff, Thomas Day; district attorney, W. F. Timmons; treasurer, E. F. Sanguinetti; surveyor, W. H. Elliott; county recorder, C P. Cronin; superintendent of public health, Henri Ap. John.

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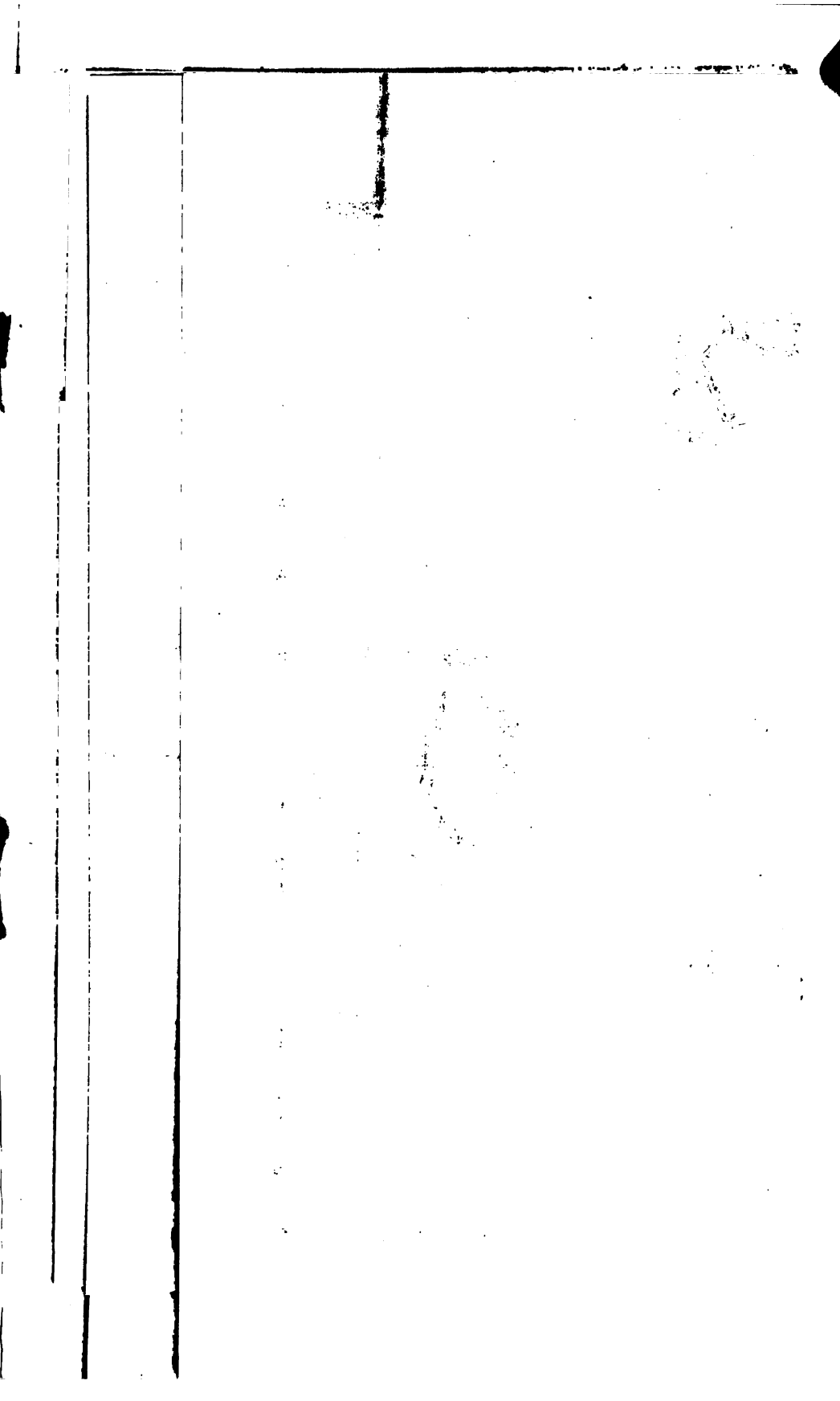

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